UNISYS

TPC Benchmark™ C Full Disclosure Report

Unisys Corporation
Enterprise Systems

Aquanta ES5045 Server

using

Microsoft SQL Server Enterprise Edition 7.0

and

Microsoft NT Server Enterprise Edition 4.0

Third Edition
August 11th 1999

Unisys Part Number 4494 8933-200

Third Edition – August 1999

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Benchmark results are highly dependent upon workload, specific application requirements, and systems design and implementation. Relative system performance will vary as a result of these and other factors. Therefore, TPC Benchmark C should not be used as a substitute for a specific customer application benchmark when critical capacity planning and/or product evaluation decisions are contemplated.

All performance data contained in this report was obtained in a rigorously controlled environment, and therefore results obtained in other operating environments may vary significantly. Unisys Corporation and Microsoft Corporation do not warrant or represent that a user can or will achieve similar performance expressed in transactions per minute (tpmC) or normalized price/performance ($/tpmC). No warranty of system performance or price/performance is expressed or implied in this report.

Printed in USA, August 1999.

Unisys Corporation Part Number: 4494 8933-200

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Abstract

Overview

This report documents the methodology and results of the TPC Benchmark C (TPC-C) conducted on the Unisys Corporation Aquanta ES5045 server. The operating system on the server was Microsoft Windows NT Server Enterprise Edition 4.0. The DBMS used was Microsoft SQL Server Enterprise Edition 7.0. The operating system on the clients was Microsoft Windows NT Server 4.0. The clients ran Microsoft's Internet Information Server 3.0 and Tuxedo 6.3 CFS for NT.

TPC Benchmark Metrics

The standard TPC Benchmark C metrics, tpmC (transactions per minute), price per tpmC (five year capital cost per measured tpmC), and the availability date are reported as required by the benchmark specification.

Executive Summary

The following pages contain the executive summary results of the benchmark.

Auditor

The benchmark configuration, environment, and methodology used to produce and validate the test results, along with the pricing model used to calculate the cost per tpmC, were audited by Tom Sawyer of Performance Metrics, Inc. to verify compliance with the relevant TPC specification.

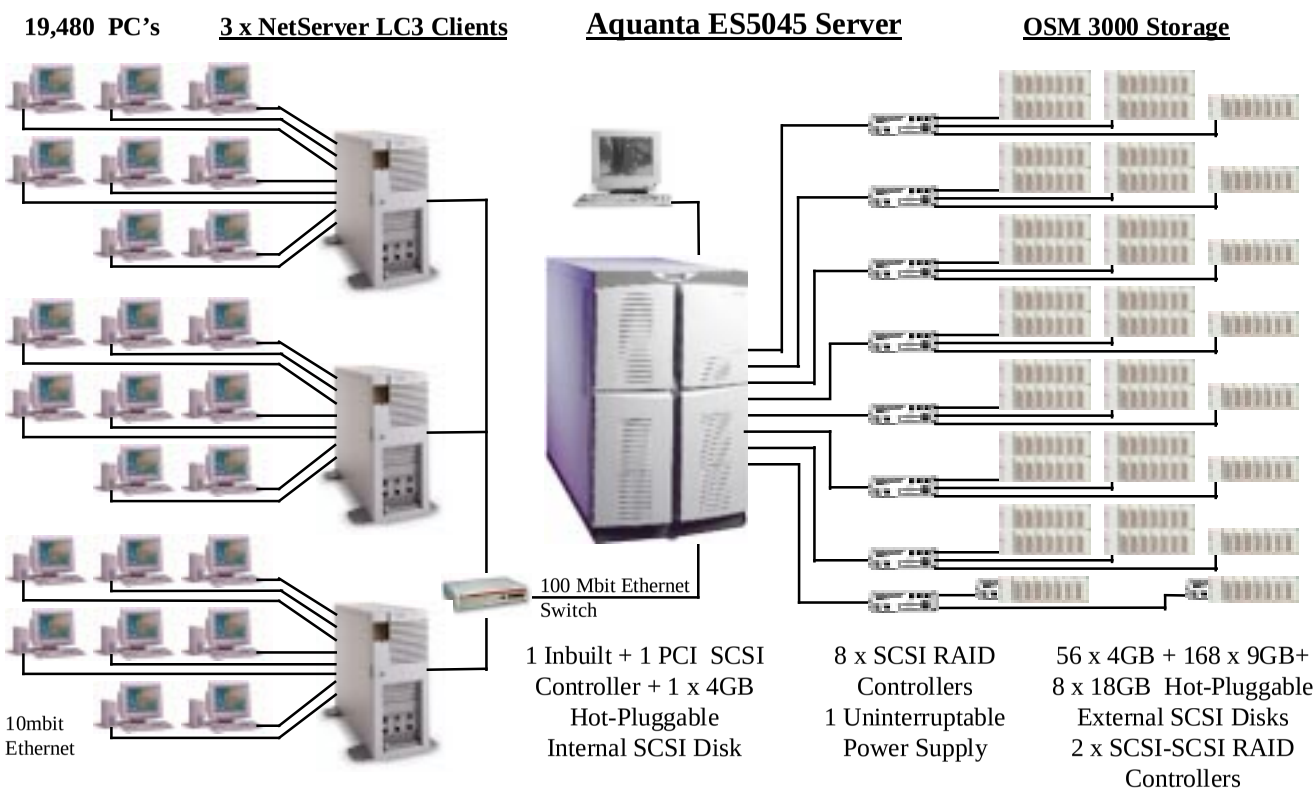
UNISYS

Aquanta ES5045 Server
(4P 500MHz/2MB)

TPC-C Rev. 3.4
Report Date: 17-Mar-1999
Reprice Date: 11-Aug-1999

Total System Cost	TPC-C Throughput	Price/Performance	Availability Date
$477,440	**24,328.67 tpmC**	**$19.62 per tpmC**	**17-Mar-1999**

Processors	Database Manager	Operating System	Other Software	Number of Users
4 Pentium® III Xeon 500 MHz 2MB L2 cache	Microsoft SQL Server Enterprise Edition 7.0	Microsoft NT Server 4.0 Enterprise Edition	Microsoft IIS 3.0 Tuxedo 6.3 CFS	**19,480**



System Components	Server		Clients	
	Quantity	Type	Quantity	Type
Processors	4	500 MHz Pentium® III Xeon with 2MB Level 2 Cache	3	2 x 450MHz Pentium® II with 512KB Level 2 Cache
Memory	1	4096MB	3	512MB
Disk Controllers	8 + 2 1 + 1	SCSI RAID Inbuilt + PCI SCSI	3	Inbuilt SCSI
Disk Drives	56 168 8	4.27 GB + 1 4.24 GB 8.54 GB 17.09 GB	3	3.97 GB
Total Storage		1815.07 GB		11.91 GB
CD-ROM / Tape	1	SCSI CD-ROM Drive	3	CD-ROM Drive

Unisys Corporation	Aquanta ES5045 Server (4P 500MHz/2MB)						TPC-C Rev 3.4 11-Aug-1999
Description	Style	Third Party Brand	Pricing	Unit Price	Qty.	Extended Price	5 Years Maint.
Server Hardware							
SYS: Aquanta ES5045, w/ CDRom, 0 Proc, 0MB Mem	ES504151-GZN		1	$6,041	1	$6,041	$3,456
PROC: 500MHz Pentium III Xeon /2MB Cache	XEO3500-2MB		1	$5,893	4	$23,572	$9,888
ACC:Voltage Regulator Module	XEO24001-VRM		1	$44	6	$264	$0
MEM:ECC Memory Board, 0MB Mem	MEM241-MBD		1	$398	1	$398	$132
MEM: 128 MB Memory Upgrade	DIM5072-128		1	$398	32	$12,736	$8,448
DISK: 4GB Drive, Ultra SCSI SCA	HDS417-CX1		1	$406	1	$406	$264
ETHERNET: 100Mbit/sec, PCI 32-bit	ETH1010051-PCI		1	$99	1	$99	
ACC: HBA, SCSI w/ VHD Connector	PCI300-SUW		1	$273	1	$273	$132
ACC: Value Add Software	ESS504010-N		1	$368	1	$368	$144
MONITOR:15-inch Color	EVG2100-P		1	$221	1	$221	
KEYBD: 104 Key Spacesaver	PCK104-SKB		1	$26	1	$26	
MOUSE: 2 Button PS2	PWM1-PS2		1	$15	1	$15	
CTRL: RAID 3-Ch PCI w/ 16MB Mem +10% spares	AMI 438-H	AMI	2	$1,395	10	$13,950	$620
					Subtotal	**$58,369**	**$23,084**
Storage Hardware							
DISK: 4GB Drive, 10K Cheetah2, SCA + 10% spares	OSD4205-W45		1	$588	62	$36,456	spared
DISK: 9GB Drive, 10K Cheetah2, SCA + 10% spares	OSD9205-W45		1	$618	185	$114,330	spared
DISK: 18GB Drive, 10K Cheetah2, SCA + 10% spares	OSD18205-W45		1	$1,153	10	$11,530	spared
CAB: Disk, 7 SCA w/ 050 I/F & Cat-Cbl, 0 Disks, 3U	OSM310050-U05		1	$1,345	14	$18,830	$10,752
CAB: Disk, 7 SCA w/ 057 I/F, 0 Disks, 3U	OSM310057-U05		1	$1,353	21	$28,413	$16,128
CAB: Disk, 7 SCA w/ 100 I/F, 0MB, 0 Disks, 3U	OSM310100-U05		1	$2,735	2	$5,470	$3,456
MEM: 32MB OSM cache	OSM1032-MEM		1	$187	2	$374	$216
PWR: 2nd Power Supply Upgrade, OSM Cabinet	OSM3000-BPF		1	$392	2	$784	$264
PWR:3000 VA UPS, 3U	UPD30001-SXR		1	$1,897	1	$1,897	$936
PWR: Distribution Unit, 6 OSM Cabinets	RM1-PDU		1	$379	6	$2,274	$3,600
CBL: SCSI 68-pin HD->VHD Conn's	CBL2210-OSM		1	$96	23	$2,208	
CAB: Rackmount Kit for Disk Cages	OSM3000-RMK		1	$84	37	$3,108	
CAB: Rack Cabinet, w/ fill pnls, 36U	CAB361-SXR		1	$1,694	3	$5,082	
CAB: Bezel kit 36U	BEZ3611-CAB		1	$295	3	$885	
CAB: Stabilizer kit 0U	WGT39581-SXR		1	$206	2	$412	
PNL: L&R side panels 36U	PAN3621-SXR		1	$283	3	$849	
CAB: Rack Cabinet, w/ fill pnls, 19U	CAB191-SXR		1	$1,621	1	$1,621	
CAB: Bezel kit 19U	BEZ1911-CAB		1	$239	1	$239	
PNL: L&R side panels 19U	PAN1921-SXR		1	$210	1	$210	
					Subtotal	**$234,972**	**$35,352**
Server Software							
Microsoft NT Server Enterprise Edition 4.0, incl 25 CALs		Microsoft	3	$3,999	1	$3,999	$0
Microsoft SQL Server Enterprise Edtion 7.0, unlimited user license		Microsoft	3	$28,999	1	$28,999	$10,475
					Subtotal	**$32,998**	**$10,475**
Client Hardware							
SYS: NetServer LC3, w/1 450MHz Proc & CDROM, 0MB Mem	D7029-AV		1	$1,660	3	$4,980	$3,600
PROC:1x450MHz Pentium II/512KB Cache UPG	D7032-AV		1	$993	3	$2,979	$1,512
MEM: 128 MB SDRAM Memory Upgrade	D6098-AV		1	$255	12	$3,060	
DISK: 4GB SCSI 3.5 Internal	D4910-AV		1	$303	3	$909	$1,764
ETHERNET: 10/100TX Mbit/sec, PCI 32-bit	D5013-AV		1	$68	15	$1,020	
ETHERNET: 100Mbit/sec, PCI 32-bit, Quad	SF1001-ET4		1	$958	3	$2,874	$1,188
MONITOR:15-inch Color	EVG2100-P		1	$221	3	$663	
					Subtotal	**$16,485**	**$8,064**
Client Software							
Microsoft Windows NT Server 4.0, incl 5 CALs		Microsoft	3	$809	3	$2,427	$0
Microsoft Visual C++ Professional 5.0		Microsoft	3	$499	1	$499	$0
TUXEDO Core Functional Services 6.3 for NT		BEA	4	$3,000	3	$9,000	$7,200
					Subtotal	**$11,926**	**$7,200**
User Connectivity							
Ethernet Switch, 4-Port 100TX TrueFast + 10% spares	NX-SW8	Netlux	5	$229	3	$687	spared
Ethernet Hub, 8-Port 10Base-T (8+1 ports) + 10% spares	Z85094	General	6	$28	2682	$75,096	spared
					Subtotal	**$75,783**	**$0**
					Total	**$430,533**	**$84,175**
Unisys Service Pre-Pay Discount							**($7,680)**
Western Micro discount			1			**($29,588)**	

Notes:

1. HW Maintenance - First 36 months that are included in Unisys warranty are upgraded to service level: Standard Performance-Gold. Last 24 months are also at service level: Standard Performance-Gold.
2. All Microsoft maintenance is covered by the maintenance cost of Microsoft SQL Server.
3. 10% or minimum 2 spares are added in place of onsite service (products have a five year return-to-vendor warranty)
4. Pricing: 1 = Western Micro, 2 = AMI, 3 = Microsoft, 4 = BEA, 5 = Netlux, 6 = Software House Int'l

Five Year Cost of Ownership	**$477,440**
TPC-C Throughput	**24,328.67**
$/tpmC	**$19.62**

The benchmark results and test methodology were audited by Tom Sawyer of Performance Metrics, Inc.

Prices used in TPC benchmarks reflect the actual prices a customer would pay for a one-time purchase of the stated components. Individually negotiated discounts are not permitted. Special prices based on assumption about past or future purchases are not permitted. All discounts reflect standard pricing policies for the listed components. For complete details, see the pricing sections of the TPC benchmarks specifications. If you find that the stated prices are not available according to these terms, please inform the TPC at pricing@tpc.org. Thank You.

NUMERICAL QUANTITIES SUMMARY
for
Unisys Aquanta ES5045 Server

MQTh, Computed Maximum Qualified Throughput: **24,328.67**
% throughput difference, reported & reproducibility runs: 0.04%

Transaction Mix

New Order	44.92%
Payment	43.02%
Delivery	4.00%
Stock-Level	4.03%
Order-Status	4.03%

Response Times

Transaction	Average	Maximum	90th %ile
New-Order	0.45	5.23	0.73
Payment	0.32	3.64	0.59
Delivery	0.11	0.72	0.12
Stock-Level	2.25	4.67	2.95
Order Status	0.36	5.34	0.63
Menu	0.11	3.62	0.11
Delivery (Deferred)	0.50	1.91	0.75

Response time delay added for emulated components (seconds)

RT Response time	0.1
Menu Response time	0.1

Keying/Think Time Times (seconds)

Transaction	Minimum	Average	Maximum
New-Order	18.00/0	18.01/12.02	18.03/120.3
Payment	3.00/0	3/12.04	3.02/120.3
Delivery	2.00/0	2/5.05	2.01/50.6
Stock-Level	2.00/0	2/5.06	2.02/50.6
Order-Status	2.00/0	2/10.1	2.02/100.71

Test Duration

Ramp up time	41 minutes
Measurement interval (M)	30 minutes
Transactions (all types) completed during measurement interval	1,624,809
Ramp-down time	365 minutes

Checkpointing:

Number of checkpoints	1
Checkpoint interval	30 minutes

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Document Structure

The TPC Benchmark C Standard Specification requires test sponsors to publish, submit to the TPC, and make available to the public, a full disclosure report for any result to be considered compliant with the specification. The required contents of the full disclosure report are specified in Clause 8.

This report is submitted to satisfy the specification's requirement for full disclosure. It documents the compliance of the benchmark implementation and execution reported for the Unisys Corporation Aquanta ES5045 Server using Microsoft SQL Server Enterprise Edition 7.0 on Microsoft Windows NT Enterprise Edition 4.0.

TPC Benchmark C Overview

The TPC Benchmark™ C Standard Specification Revision 3.4 was developed by the Transaction Processing Performance Council (TPC). It is the intent of the TPC to develop a suite of benchmarks to measure the performance of computer systems executing a wide range of applications. Unisys and Microsoft Corporations are active participants in the TPC to define and develop such a suite of benchmarks.

TPC Benchmark™ C (TPC-C) is an OLTP workload. It is a mixture of read-only and update intensive transactions that simulate the activities found in complex OLTP application environments. It does so by exercising a breadth of system components associated with such environments, which are characterized by:

- The simultaneous execution of multiple transaction types that span a breadth of complexity.
- On-line and deferred transaction execution modes.
- Multiple on-line terminal sessions.
- Moderate system and application execution time.
- Significant disk input/output.
- Transaction integrity (ACID properties).
- Non-uniform distribution of data access through primary and secondary keys.
- Databases consisting of many tables with a wide variety of sizes, attributes, and relationships.
- Contention on data access and update.

The performance metric reported by TPC-C is a "business throughput" measuring the number of orders processed per minute. Multiple transactions are used to simulate the business activity of processing an order, and each transaction is subject to a response time constraint. The performance metric for this benchmark is expressed in transactions-per-minute-C (tpmC). To be compliant with the TPC-C standard, all references to tpmC results must include the tpmC rate, the associated price-per-tpmC, and the availability date of the priced configuration.

Despite the fact that this benchmark offers a rich environment that emulates many OLTP environments, this benchmark does not reflect the entire range of OLTP requirements. In addition, the extent to which a customer can achieve the results reported by a vendor is highly dependent on how closely TPC-C approximates the customer application. The relative performance of systems derived from this benchmark does not necessarily hold for other workloads or environments. Extrapolations to any other environment are not recommended.

0. General Items

0.1. Order and Titles

The order and titles of sections in the Test Sponsor's Full Disclosure report must correspond with the order and titles of sections from the TPC-C standard specification (i.e., this document). The intent is to make it as easy as possible for readers to compare and contrast material in different Full Disclosure reports.

The order and titles of the sections in this report correspond with those from the TPC-C standard specification.

0.2. Executive Summary Statement

The TPC Executive Summary Statement must be included near the beginning of the Full Disclosure report.

The TPC Executive Summary Statement is included near the beginning of this report.

0.3. Numerical Quantities Summary

The numerical quantities listed below must be summarized near the beginning of the Full Disclosure Report :

- *measurement interval in minutes,*
- *number of checkpoints in the measurement interval,*
- *checkpoint interval in minutes,*
- *number of transactions (all types) completed within the measurement interval,*
- *computed Maximum Qualified Throughput in tpmC,*
- *percentage difference between reported throughput and throughput obtained in reproducibility run,*
- *ninetieth percentile, average and maximum response times for the New-Order, Payment, Order-Status, Stock-Level, Delivery (deferred and interactive) and Menu transactions,*
- *time in seconds added to response time to compensate for delays associated with emulated components,*
- *percentage of transaction mix for each transaction type.*

These numerical quantities are summarized near the beginning of this report.

0.4. Application Code Disclosure

The applicable program (as defined in Clause 2.1.7) must be disclosed. This includes, but is not limited to, the code implementing the five transactions and the terminal input and output functions.

Appendix A contains the client application code used in this TPC-C benchmark. Appendix B contains the SQL stored procedures which implement the TPC-C transactions.

0.5. Benchmark Sponsor

A statement identifying the benchmark sponsor(s) and other participating companies must be provided.

This TPC benchmark C was sponsored by Unisys Corporation. The benchmark test was developed by Microsoft and Unisys. The benchmark was conducted at Unisys, Mission Viejo, California.

0.6. Parameter Settings

Settings must be provided for all customer-tunable parameters and options which have been changed from the defaults found in actual products, including but not limited to:

- *Data Base tuning options*
- *Recovery/commit options*
- *Consistency/locking options*
- *Operating system and application configuration parameters*

Appendix C contains the configuration and system parameters used in running these TPC-C tests. It also contains all the client and server OS and SQL Server tunable parameters.

0.7. Configuration Diagrams

Diagrams of both measured and priced configurations must be provided, accompanied by a description of the differences. This includes, but is not limited to:

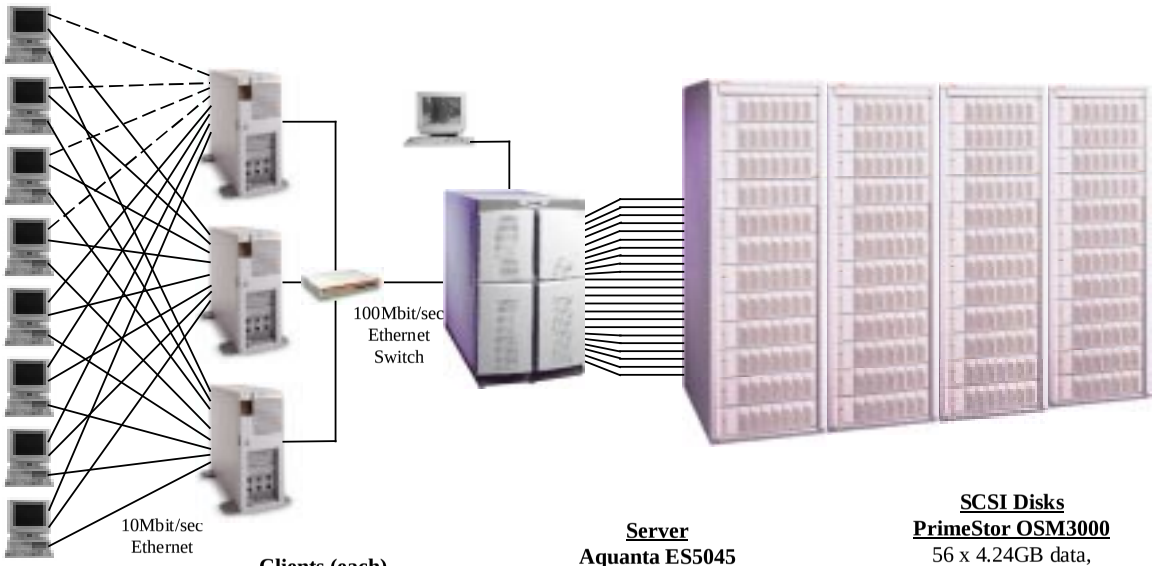
- *Number and type of processors.*
- *Size of allocated memory, and any specific mapping/partitioning of memory unique to the test.*
- *Number and type of disk units (and controllers, if applicable).*
- *Number of channels or bus connections to disk units, including their protocol type.*
- *Number of LAN (e.g., Ethernet) connections, including routers, workstations, terminals, etc., that were physically used in the test or are incorporated into the pricing structure (see Clause 8.1.8).*
- *Type and the run-time execution location of software components (e.g., DBMS, client processes, transaction monitors, software drivers, etc.).*

The Remote Terminal Emulator (RTE) software used for these TPC-C tests is proprietary to Unisys. The benchmarked configuration of the RTE and Aquanta ES5045 server is illustrated in Figure 0.1. Tables 4.3, 4.4 and 4.5 contain a detailed explanation of the disk configuration.

The priced configuration for the Aquanta ES5045 server is shown in Figure 0.2. Client cabinets D7026-AV used in the benchmarked configuration are discontinued and replaced with D7028-AV cabinets in the priced configuration (active components in both configurations are the same).

Figure 0.1: Benchmarked Configuration

Aquanta ES5045 Server - Benchmarked Configuration



8 RTEs
emulating 19,480 users
4 LANs w/ 820 users each
20 LANs w/ 810 users each

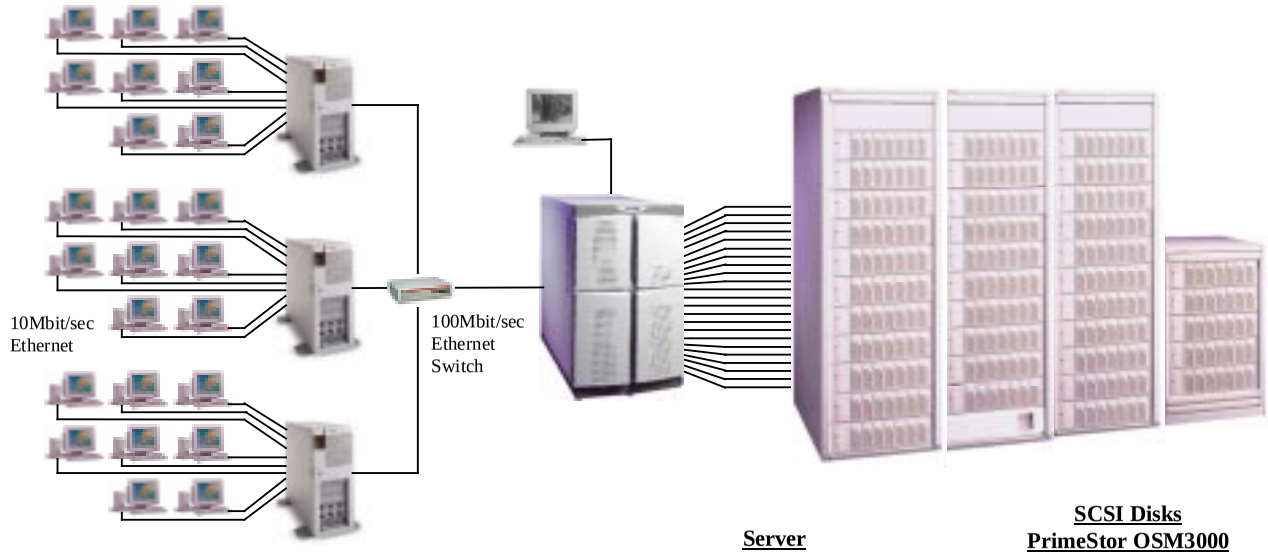
Clients (each)
NetServer LC3
2x 450MHz Pentium® II CPU,
512KB L2 cache,
512MB memory,
1 x 3.97GB disk,
5 PCI Fast Ethernet adapters for Server & RTE connection,
1 PCI Quad Ethernet adapter for RTE connections

Server
Aquanta ES5045
4x Pentium® III Xeon 500MHz CPUs,
2MB L2 cache per CPU,
4GB memory,
1 Internal SCSI controller,
1 PCI SCSI wide controller
1 PCI Fast Ethernet adapter
1 x 4.24GB internal SCSI disk,
8 PCI SCSI RAID controllers,

SCSI Disks
PrimeStor OSM3000
56 x 4.24GB data,
168 x 8.48GB data
8 x 17.xxGB logs,
14 x 18GB (backup),
2 x 8.48GB (backup)
2 x 4.24GB (backup)
2 x SCSI-SCSI RAID Controllers

Figure 0.2: Priced Configuration

Aquanta ES5045 Server - Priced Configuration



19,480 PC's
1 Client w/ 6520 users
2 Clients w/ 6480 users

Clients (each)
NetServer LC3
2x 450MHz Pentium® II CPU,
512KB L2 cache,
512MB memory,
1 x 3.97GB disk,
5 PCI Fast Ethernet adapters for Server & Client connection,
1 PCI Quad Ethernet adapter for Client connections

Server
Aquanta ES5045
4x Pentium® III Xeon 500MHz CPUs,
2MB L2 cache per CPU,
4GB memory,
1 Internal SCSI controller,
1 PCI SCSI wide controller
1 PCI Fast Ethernet adapter
1 x 4.24GB internal SCSI disk,
8 PCI SCSI RAID controllers,

SCSI Disks
PrimeStor OSM3000
56 x 4.27GB data
168 x 8.54GB data
8 x 17.09GB logs,
2 x SCSI-SCSI RAID Controllers
1 Uninterruptable Power Supply

1. Clause 1: Logical Database Design

1.1. Table Definitions

Listings must be provided for all table definition statements and all other statements used to setup the data base.

Appendix B contains the SQL definitions of all the required database files, filegroups, tables, indexes and stored procedures, plus a listing of the program used to load the database and establish the required initial populations of each table.

1.2. Physical Organization of the Database

The physical organization of tables and indices, within the data base, must be disclosed.

The disk space was allocated to SQL Server according to the data in Tables 4.3, 4.4 and 4.5. The SQL definitions are contained in Appendix B.

1.3. Insert and/or Delete Operations

It must be ascertained that insert and/or delete operations to any of the tables can occur concurrently with the TPC-C transaction mix. Furthermore, any restriction in the SUT data base implementation that precludes inserts beyond the limits defined in Clause 1.4.11 must be disclosed. This includes the maximum number of rows that can be inserted and the maximum key value for these new rows.

There were no restrictions on insert and/or delete operations to any of the tables.

1.4. Partitioning

While there are few restrictions placed upon horizontal or vertical partitioning of tables and rows in the TPC-C benchmark, any such partitioning must be disclosed.

Partitioning was not used for any table in this implementation.

1.5. Replication, Duplication or Additions

Replication of tables, if used, must be disclosed.

Additional and/or duplicate attributes in any table must be disclosed along with a statement on the impact on performance.

No replications, duplications or additional attributes were used in this implementation.

2. Clause 2: Transaction & Terminal Profiles

2.1. Random Number Generation

The method of verification for the random number generation must be disclosed.

The drivers used the Unisys RTE program, which was independently audited. The initial population of the database was performed by the loader program from V4.01 of the Microsoft TPC-C toolkit, which was also independently audited. Furthermore, the auditor sampled various initial and runtime distributions produced by this implementation to verify correctness.

2.2. Input/Output Screen Layout

The actual layout of the terminal input/output screens must be disclosed.

The screen layouts are based on those in Clauses 2.4.3, 2.5.3, 2.6.3, 2.7.3. and 2.8.3 of the TPC Benchmark C Standard Specification. There are some minor differences in appearance due to the use of a web client implementation.

2.3. Priced Terminal Feature Verification

The method used to verify that the emulated terminals provide all the features described in Clause 2.2.2.4 must be explained. Although not specifically priced, the type and model of the terminals used for the demonstration in 8.1.3.3 must be disclosed and commercially available (including supporting software and maintenance).

This was verified by the auditor.

2.4. Presentation Managers or Intelligent Terminal

Any usage of presentation managers or intelligent terminals must be explained.

Application code running on the client implemented the TPC-C user interface. A listing of this code is included in Appendix A. No presentation manager was used on the client, as screen manipulation and data input/output was handled for each user by the Microsoft Internet Explorer web browser running on each user PC.

2.5. Transaction Statistics

The percentage of New-Order transactions that were rolled back as a result of an unused item number must be disclosed.

The number of items per order entered by New-Order transactions must be disclosed.

The percentage of home and remote Payment transactions must be disclosed.

The percentage of Payment and Order-Status transactions that used non-primary key (C_LAST) access to the database must be disclosed.

The percentage of Delivery transactions that were skipped as a result of an insufficient number of rows in the NEW-ORDER table must be disclosed.

The mix (i.e., percentages) of transaction types seen by the SUT must be disclosed.

Table 5.4 in Section 5 contains all these statistics.

2.6. Queuing Mechanism of Delivery

The queuing mechanism used to defer execution of the Delivery transaction must be disclosed.

Tuxedo provides the queue for delivery servers. The client application process posts delivery transactions to the delivery queue using a Tuxedo asynchronous call with the TPNoReply option. Upon return from this call, the client application provides a 'delivery queued' response to the user. Delivery servers independently retrieve messages from their queue, submit them to the data base for processing, and log the result to a file upon completion. The source code for this delivery process is included in Appendix A.

3. Clause 3: Transaction & System Properties

3.1. Transaction System Properties (ACID)

The results of the ACID tests must be disclosed along with a description of how the ACID requirements were met. This includes disclosing which case was followed for the execution of Isolation Test 7.

The TPC Benchmark C Standard Specification defines a set of transaction processing system properties that a system under test (SUT) must support during the execution of the benchmark. Those properties are Atomicity, Consistency, Isolation, and Durability (ACID).

This section defines each of these properties, describes the steps taken to ensure that they were present during the test and describes a series of tests done to demonstrate compliance with the specification. All ACID property tests were executed successfully.

3.2. Atomicity

The system under test must guarantee that data base transactions are atomic; the system will either perform all individual operations on the data, or will assure that no partially-completed operations leave any effects on the data.

3.2.1. Completed Transaction

Perform the Payment transaction for a randomly selected warehouse, district, and customer (by customer number) and verify that the records in the CUSTOMER, DISTRICT, and WAREHOUSE tables have been changed appropriately.

The balances from a randomly selected warehouse, district, and customer row were retrieved by customer number from a script. A Payment transaction was submitted with the same warehouse, district and customer identifiers for a known amount. After completion of the Payment transaction, the balances of the selected warehouse, district, and customer were again retrieved to verify that the changes had been made correctly.

3.2.2. Aborted Transactions

Perform the Payment transaction for a randomly selected warehouse, district, and customer (by customer number) and substitute a ROLLBACK of the transaction for the COMMIT of the transaction. Verify that the records in the CUSTOMER, DISTRICT, and WAREHOUSE tables have NOT been changed.

The balances from a randomly selected warehouse, district, and customer row were retrieved by customer number from a script. A Payment transaction was submitted with the same warehouse, district and customer identifiers that issued a ROLLBACK command rather than a COMMIT. After the transaction completed, the balances of the selected warehouse, district, and customer were again retrieved to verify that no changes had been made to the database.

3.3. Consistency

Consistency is the property of the application that requires any execution of a data base transaction to take the data base from one consistent state to another, assuming that the data base is initially in a consistent state.

The benchmark specification requires explicit demonstration of the following four consistency conditions:

1. The sum of the district balances in a warehouse is equal to the warehouse balance;
2. For each district, the next order id minus one is equal to maximum order id in the ORDER table and equal to the maximum new order id in the NEW ORDER table;
3. For each district, the maximum order id minus minimum order id in the ORDER table plus one equals the number of rows in the NEW-ORDER table for that district;
4. For each district, the sum of the order line counts in the ORDER table equals the number of rows in the ORDER-LINE table for that district;

In order to demonstrate this consistency, the following steps were taken:

1. Prior to the start of a benchmark run, the consistency of the database was verified by testing successfully conditions 1-4 described above with a script.
2. A run under full user load was executed for over 10 minutes with a checkpoint during the run.
3. After completion of that test, the consistency of the database was again verified by successfully testing using the same consistency script as in step 1.

3.4. Isolation

Sufficient conditions must be enabled at either the system or application level to ensure the required isolation defined above (clause 3.4.1) is obtained.

The benchmark specification defines seven required tests to be performed to demonstrate that required levels of transaction isolation are met. These tests, described in Clauses 3.4.2.1 - 3.4.2.7, were all performed from a script and verified by the auditor. In Isolation Test 7, Case A was observed. In addition, the phantom tests and stock level tests were executed and verified to be successful.

3.5. Durability

The tested system must guarantee durability: the ability to preserve the effects of committed transactions and insure data base consistency after recovery from any one of the failures listed in Clause 3.5.3.

Three durability tests were executed to satisfy the requirements of the specification. The test for loss of memory and instantaneous interruption was combined and performed with a fully scaled database. The loss of log and loss of data tests were performed on the same system, using a ten warehouse database with 100 emulated users. To the best of our knowledge, these tests prove that the fully scaled configuration used for the throughput test would also meet all durability tests.

3.5.1. Loss of Log Disk and Loss of Data Disk

The following steps were taken (using a ten warehouse database on the same system) to demonstrate durability in the case of loss of a log disk and of data disk. The same log disks and controllers were used for the log as for the fully scaled database. Two separate data disks were on each of two existing controllers.

1. The database was backed up to extra disks on a dump device.
2. The D_NEXT_O_ID fields for all rows in the district table were summed up to determine the initial count of orders present in the database.
3. The RTE was started with 100 users. On the driver systems, committed and rolled back New-Order transactions were recorded in a “success” file.
4. After ten minutes of running at steady state, a hot-pluggable log disk was removed from the disk cabinet, with no effect on NT or SQL server.

5. After 5 additional minutes of operation, a hot-pluggable data disk was removed from the disk cabinet.
6. NT and SQL Server encountered IO errors due to the missing disk and recorded these errors in the NT event log and SQL Server error log, respectively. The RTEs also recorded errors.
7. First, the RTEs and clients were stopped, then SQL Server was used to take a dump of the transaction log to the dump device.
8. Next, SQL server was shutdown, then restarted, and scripts were executed to drop the database and all its devices. Then, SQL Server was shutdown again and the SUT shutdown.
9. A data disk was inserted in the disk cabinet to replace the one removed. The RAID controller was used to recreate the stripe set containing the new data disk. (The missing log drive was not replaced.)
10. The SUT was restarted, and Disk Administrator was used to assign the proper drive letter to the new volume. SQL Server was then restarted and a new (empty) database created as part of the restore database process. That process loaded the initial database into the new database, but did not perform any recovery. Next the transaction log was restored, followed by transaction recovery. The latter step restored all committed transactions to the database.
11. Consistency condition 3 of Clause 3.3.2.3 was executed to verify database consistency.
12. Step 2 was repeated to determine the total number of orders. This number was subtracted from the count obtained previously in Step 2 to determine the number of additional orders added to the database.
13. The contents of the "success" files on the drivers were sampled to verify that the records in the "success" file for committed New-Order transactions had corresponding records in the ORDER. Moreover, the counts were matched with those obtained in step 12.

3.5.2. Instantaneous Interruption and Loss of Memory

Instantaneous interruption and loss of memory tests were combined because the loss of power erased the contents of memory. This failure was induced by removing the primary power to the System Under Test while the benchmark was executing.

1. The D_NEXT_O_ID fields for all rows in the district table were summed up to determine the initial count of orders present in the database (count1).
2. On the driver systems, committed and rolled back New-Order transaction were recorded in a "success" file.
3. The benchmark was executed at full load with all emulated users for a minimum of 10 minutes.
4. Shortly after execution of a checkpoint completed, the system's primary power was turned off.
5. After transaction failures were noted by the RTEs, the RTEs and clients were shutdown.
6. Power was restored to the SUT, the system rebooted, SQL Server was restarted, and automatic database recovery was performed. The database recovery used the transaction log to reapply all committed transactions and rollback any (in progress) uncommitted transactions, so that the database disks were correct.
7. After recovery finished, Consistency Condition of Clause 3.3.2.3 (no gaps in NO_O_ID) was executed to verify that the database was consistent..
8. Next, samples of the contents of the "success" file from the drivers were compared against corresponding rows of the ORDER table to verify that records in the "success" file for committed New-Order transactions had corresponding records in the ORDER table.
9. Finally, step 1 was repeated to determine the total number of orders (count2). Count2 minus count1 was not less than the number of committed New-Order records in the "success" file.

4. Clause 4: Scaling & Database Population

4.1. Initial Cardinality of Tables

The Cardinality (e.g., the number of rows) of each table, as it existed at the start of the benchmark run, must be disclosed. If the database was over-scaled and inactive rows of the WAREHOUSE table were deleted (see Clause 4.2.2 and the Auditor's attestation letter) the cardinality of the WAREHOUSE table as initially configured and the number of rows deleted must be disclosed.

The TPC-C database for this test was configured with 1,968 warehouses. The cardinality of each table in the database is listed in Table 4.1

Table 4.1: Initial Cardinality of Database Table

Table	Occurrences
Warehouse	1,968
District	19,680
Customer	59,040,000
History	59,040,000
Order	59,040,000
New-Order	17,712,000
Order Line	590,403,579
Stock	196,800,000
Item	100,000

20 rows were deleted from the warehouse table before executing the measurement runs.

4.2. Constant Values

The following values were used as the constant C input values to the NURand function during Build and Run time for this implementation.

Table 4.2: Constant C for NURand

Function	Value
C_LAST (Build)	123
C_LAST (Run)	208

4.3. Database Layout

The distribution of tables and logs across all media must be explicitly depicted for the tested and priced systems.

Tables 4.3, 4.4 and 4.5 list the distribution of the database over 224 disks and the transaction log over 4 mirrored pairs of disks for the benchmark configuration. Database backup used free space on some of those data drives. In addition, there was one disk containing Windows NT Enterprise Edition and SQL Server Enterprise Edition code and the Master database plus the paging file. The 10 warehouse durability database used 4 extra disks which were not present during the rest of the benchmark and were excluded from the priced configuration.

4.4. DBMS: Data Model and DBMS Interface/Access Language

A statement must be provided that describes:

1. *The data model implemented by the DBMS used (e.g., relational, network, hierarchical).*

2. *The database interface (e.g., embedded, call level) and access language (e.g., SQL, DL/1, COBOL, read/write) used to implement the TPC-C transactions. If more than one interface/access language is used to implement TPC-C, each interface/access language must be described and a list of which interface/access language is used with which transaction type must be disclosed.*

Microsoft SQL Server Enterprise Edition 7.0 is a relational DBMS.

The client software interfaced to SQL Server through Stored Procedures invoked through Remote Procedure Calls embedded in the C application code. Specifically, DBLIB and TCP/IP sockets were used.

4.5. DBMS Partitions/Replications

The mapping of database partitions/replications must be explicitly described.

No table partitioning or replication was done.

4.6. DBMS Space Requirements

Details of the 180 day space computation along with proof that the database is configured to sustain 8 hours of growth for dynamic tables (Order, Order-line, and History) must be disclosed (see Clause 4.2.3).

Appendix E lists the space requirements for the 180-day space as well as the logical log space for eight hours.

Table 4.3: Disk Cage Configuration

Disk Cage Configuration									
Adapter	**Channel**	**Id**	**Id**	**Id**	**Id**	**Id**	**Id**	**Id**	**Rack #**
1	**0**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	
		4GB	4GB	4GB	9GB	9GB	9GB	9GB	1
		8	**9**	**10**	**11**	**12**	**13**	**14**	
		9GB	9GB	9GB	9GB	9GB	9GB	empty	2
	1	**0**	**1**	**2**	**3**	**4**	**5**	**6**	
		4GB	4GB	4GB	9GB	9GB	9GB	9GB	3
		8	**9**	**10**	**11**	**12**	**13**	**14**	
		9GB	9GB	9GB	9GB	9GB	empty	empty	4
	2	**0**	**1**	**2**	**3**	**4**	**5**	**6**	
		4GB	4GB	9GB	9GB	9GB	9GB	9GB	5
2	**0**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	
		18GB	18GB	18GB	18GB	empty	empty	empty	6
	1	**0**	**1**	**2**	**3**	**4**	**5**	**6**	
		18GB	18GB	18GB	18GB	empty	empty	empty	7
3	**0**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	
		4GB	4GB	4GB	9GB	9GB	9GB	9GB	8
		8	**9**	**10**	**11**	**12**	**13**	**14**	
		9GB	9GB	9GB	9GB	9GB	9GB	empty	9
	1	**0**	**1**	**2**	**3**	**4**	**5**	**6**	
		4GB	4GB	4GB	9GB	9GB	9GB	9GB	10
		8	**9**	**10**	**11**	**12**	**13**	**14**	
		9GB	9GB	9GB	9GB	9GB	empty	empty	11
	2	**0**	**1**	**2**	**3**	**4**	**5**	**6**	
		4GB	4GB	9GB	9GB	9GB	9GB	9GB	12
4	**0**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	
		4GB	4GB	4GB	9GB	9GB	9GB	9GB	13
		8	**9**	**10**	**11**	**12**	**13**	**14**	
		9GB	9GB	9GB	9GB	9GB	9GB	empty	14
	1	**0**	**1**	**2**	**3**	**4**	**5**	**6**	
		4GB	4GB	4GB	9GB	9GB	9GB	9GB	15
		8	**9**	**10**	**11**	**12**	**13**	**14**	
		9GB	9GB	9GB	9GB	9GB	empty	empty	16
	2	**0**	**1**	**2**	**3**	**4**	**5**	**6**	
		4GB	4GB	9GB	9GB	9GB	9GB	9GB	17
5	**0**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	
		4GB	4GB	4GB	9GB	9GB	9GB	9GB	18
		8	**9**	**10**	**11**	**12**	**13**	**14**	
		9GB	9GB	9GB	9GB	9GB	9GB	empty	19
	1	**0**	**1**	**2**	**3**	**4**	**5**	**6**	
		4GB	4GB	4GB	9GB	9GB	9GB	9GB	20
		8	**9**	**10**	**11**	**12**	**13**	**14**	
		9GB	9GB	9GB	9GB	9GB	empty	empty	21
	2	**0**	**1**	**2**	**3**	**4**	**5**	**6**	
		4GB	4GB	9GB	9GB	9GB	9GB	9GB	22

Table 4.3: Disk Cage Configuration (Continued)

Disk Cage Configuration									
Adapter	**Channel**	**Id**	**Id**	**Id**	**Id**	**Id**	**Id**	**Id**	**Rack #**
6	**0**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	
		4GB	4GB	4GB	9GB	9GB	9GB	9GB	23
		8	**9**	**10**	**11**	**12**	**13**	**14**	
		9GB	9GB	9GB	9GB	9GB	9GB	empty	24
	1	**0**	**1**	**2**	**3**	**4**	**5**	**6**	
		4GB	4GB	4GB	9GB	9GB	9GB	9GB	25
		8	**9**	**10**	**11**	**12**	**13**	**14**	
		9GB	9GB	9GB	9GB	9GB	empty	empty	26
	2	**0**	**1**	**2**	**3**	**4**	**5**	**6**	
		4GB	4GB	9GB	9GB	9GB	9GB	9GB	27
7	**0**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	
		4GB	4GB	4GB	9GB	9GB	9GB	9GB	28
		8	**9**	**10**	**11**	**12**	**13**	**14**	
		9GB	9GB	9GB	9GB	9GB	9GB	empty	29
	1	**0**	**1**	**2**	**3**	**4**	**5**	**6**	
		4GB	4GB	4GB	9GB	9GB	9GB	9GB	30
		8	**9**	**10**	**11**	**12**	**13**	**14**	
		9GB	9GB	9GB	9GB	9GB	empty	empty	31
	2	**0**	**1**	**2**	**3**	**4**	**5**	**6**	
		4GB	4GB	9GB	9GB	9GB	9GB	9GB	32
8	**0**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	
		4GB	4GB	4GB	9GB	9GB	9GB	9GB	33
		8	**9**	**10**	**11**	**12**	**13**	**14**	
		9GB	9GB	9GB	9GB	9GB	9GB	empty	34
	1	**0**	**1**	**2**	**3**	**4**	**5**	**6**	
		4GB	4GB	4GB	9GB	9GB	9GB	9GB	35
		8	**9**	**10**	**11**	**12**	**13**	**14**	
		9GB	9GB	9GB	9GB	9GB	empty	empty	36
	2	**0**	**1**	**2**	**3**	**4**	**5**	**6**	
		4GB	4GB	9GB	9GB	9GB	9GB	9GB	37

Table 4.4: RAID Adapter Disk Configuration

RAID Adapter Disk Configuration						
Adapter	ID	Channel 0	Channel 1	Channel 2	RAID Configuration	Drive Letters
1	0	A1-1	A1-2	A1-3	Configure Arrays 1-4 as RAID 0	E: and S:
	1	A1-4	A1-5	A1-6		
	2	A1-7	A1-8	A2-3		
	3	A2-1	A2-2	A2-6		
	4	A2-4	A2-5	A3-3		
	5	A2-7	A2-8	A3-6		
	6	A3-1	A3-2	A4-3		
	8	A3-4	A3-5			
	9	A3-7	A3-8			
	10	A4-1	A4-2			
	11	A4-4	A4-5			
	12	A4-6	A4-7			
	13	A4-8				
	14					
2	0	A1-1	A1-2		Configure Array 1 as RAID 1 (log)	L:
	1					
	2					
	3					
	4					
	5					
	6					
	8					
	9					
	10					
	11					
	12					
	13					
	14					
3	0	A1-1	A1-2	A1-3	Configure Arrays 1-4 as RAID 0	F: and R:
	1	A1-4	A1-5	A1-6		
	2	A1-7	A1-8	A2-3		
	3	A2-1	A2-2	A2-6		
	4	A2-4	A2-5	A3-3		
	5	A2-7	A2-8	A3-6		
	6	A3-1	A3-2	A4-3		
	8	A3-4	A3-5			
	9	A3-7	A3-8			
	10	A4-1	A4-2			
	11	A4-4	A4-5			
	12	A4-6	A4-7			
	13	A4-8				
	14					

Table 4.4: RAID Adapter Disk Configuration (Continued)

RAID Adapter Disk Configuration						
Adapter	ID	Channel 0	Channel 1	Channel 2	RAID Configuration	Drive Letters
4	0	A1-1	A1-2	A1-3	Configure Arrays 1-4 as RAID 0	G: and Q:
	1	A1-4	A1-5	A1-6		
	2	A1-7	A1-8	A2-3		
	3	A2-1	A2-2	A2-6		
	4	A2-4	A2-5	A3-3		
	5	A2-7	A2-8	A3-6		
	6	A3-1	A3-2	A4-3		
	8	A3-4	A3-5			
	9	A3-7	A3-8			
	10	A4-1	A4-2			
	11	A4-4	A4-5			
	12	A4-6	A4-7			
	13	A4-8				
	14					
5	0	A1-1	A1-2	A1-3	Configure Arrays 1-4 as RAID 0	H: and P:
	1	A1-4	A1-5	A1-6		
	2	A1-7	A1-8	A2-3		
	3	A2-1	A2-2	A2-6		
	4	A2-4	A2-5	A3-3		
	5	A2-7	A2-8	A3-6		
	6	A3-1	A3-2	A4-3		
	8	A3-4	A3-5			
	9	A3-7	A3-8			
	10	A4-1	A4-2			
	11	A4-4	A4-5			
	12	A4-6	A4-7			
	13	A4-8				
	14					
6	0	A1-1	A1-2	A1-3	Configure Arrays 1-4 as RAID 0	I: and O:
	1	A1-4	A1-5	A1-6		
	2	A1-7	A1-8	A2-3		
	3	A2-1	A2-2	A2-6		
	4	A2-4	A2-5	A3-3		
	5	A2-7	A2-8	A3-6		
	6	A3-1	A3-2	A4-3		
	8	A3-4	A3-5			
	9	A3-7	A3-8			
	10	A4-1	A4-2			
	11	A4-4	A4-5			
	12	A4-6	A4-7			
	13	A4-8				
	14					

Table 4.4: RAID Adapter Disk Configuration (Continued)

RAID Adapter Disk Configuration						
Adapter	ID	Channel 0	Channel 1	Channel 2	RAID Configuration	Drive Letters
7	0	A1-1	A1-2	A1-3	Configure Arrays 1-4 as RAID 0	J: and N:
	1	A1-4	A1-5	A1-6		
	2	A1-7	A1-8	A2-3		
	3	A2-1	A2-2	A2-6		
	4	A2-4	A2-5	A3-3		
	5	A2-7	A2-8	A3-6		
	6	A3-1	A3-2	A4-3		
	8	A3-4	A3-5			
	9	A3-7	A3-8			
	10	A4-1	A4-2			
	11	A4-4	A4-5			
	12	A4-6	A4-7			
	13	A4-8				
	14					
8	0	A1-1	A1-2	A1-3	Configure Arrays 1-4 as RAID 0	K: and M:
	1	A1-4	A1-5	A1-6		
	2	A1-7	A1-8	A2-3		
	3	A2-1	A2-2	A2-6		
	4	A2-4	A2-5	A3-3		
	5	A2-7	A2-8	A3-6		
	6	A3-1	A3-2	A4-3		
	8	A3-4	A3-5			
	9	A3-7	A3-8			
	10	A4-1	A4-2			
	11	A4-4	A4-5			
	12	A4-6	A4-7			
	13	A4-8				
	14					

Table 4.5: Disk Administrator Configuration

Disk Administrator Configuration			
Disk 0 244904 MB	E: unknown 16805 MB	S: unknown 7880 MB	 free space 200219 MB
Disk 1 69986 MB	L: unknown 68805 MB	 unknown 1181 MB	 free space 0 MB
Disk 2 244904 MB	F: unknown 16805 MB	R: unknown 7880 MB	 free space 200219 MB
Disk 3 244904 MB	G: unknown 16805 MB	Q: unknown 7880 MB	 free space 200219 MB
Disk 4 244904 MB	H: unknown 16805 MB	P: unknown 7880 MB	T: BACK1 NTFS 200219 MB
Disk 5 244904 MB	I: unknown 16805 MB	O: unknown 7880 MB	U: BACK2 NTFS 200219 MB
Disk 6 244904 MB	J: unknown 16805 MB	N: unknown 7880 MB	V: BACK3 NTFS 200219 MB
Disk 7 244904 MB	K: unknown 16805 MB	M: unknown 7880 MB	 free space 200219 MB
Disk 8 4338 MB	C: SYSTEM FAT 2047 MB	Z: testfiles NTFS 2291 MB	 free space 0 MB
CD-ROM 0	D:		

5. Clause 5: Performance Metrics & Response Time

5.1. Measured Throughput (tpmC)

Measured tpmC must be reported.

The measured tpmC was 24,328.67.

5.2. Response Times

Ninetieth percentile, maximum and average response times must be reported for all transaction types as well as for the Menu response time.

Table 5.1: Response Time Data

Transaction	Average	Maximum	90th %ile
New-Order	0.45	5.23	0.73
Payment	0.32	3.64	0.59
Delivery	0.11	0.72	0.12
Stock-Level	2.25	4.67	2.95
Order Status	0.36	5.34	0.63
Menu	0.11	3.62	0.11
Delivery (Deferred)	0.50	1.91	0.75

5.3. Keying and Think Times

The minimum, the average, and the maximum keying and think times must be reported for each transaction type.

Table 5.2: Keying Times

Transaction	Minimum	Average	Maximum
New-Order	18.00	18.01	18.03
Payment	3.00	3.00	3.02
Delivery	2.00	2.00	2.01
Stock-Level	2.00	2.00	2.02
Order Status	2.00	2.00	2.02

Table 5.3: Think Times

Transaction	Minimum	Average	Maximum
New-Order	0.00	12.02	120.30
Payment	0.00	12.04	120.30
Delivery	0.00	5.05	50.60
Stock-Level	0.00	5.06	50.60
Order Status	0.00	10.10	100.71

5.4. Response Time Frequency Distribution Curves

Response Time frequency distribution curves (see Clause 5.6.1) must be reported for each transaction type.

Figure 5.1: New Order Response Time Distribution

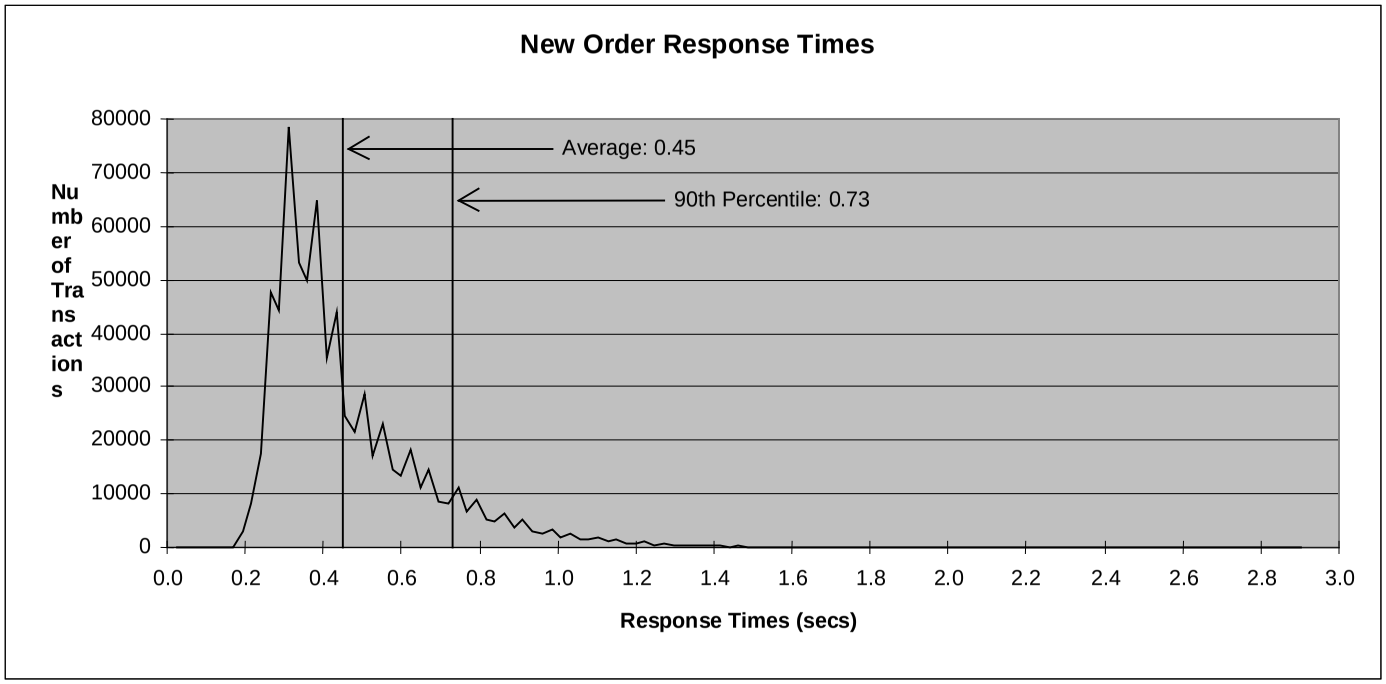


Figure 5.2: Payment Response Time Distribution

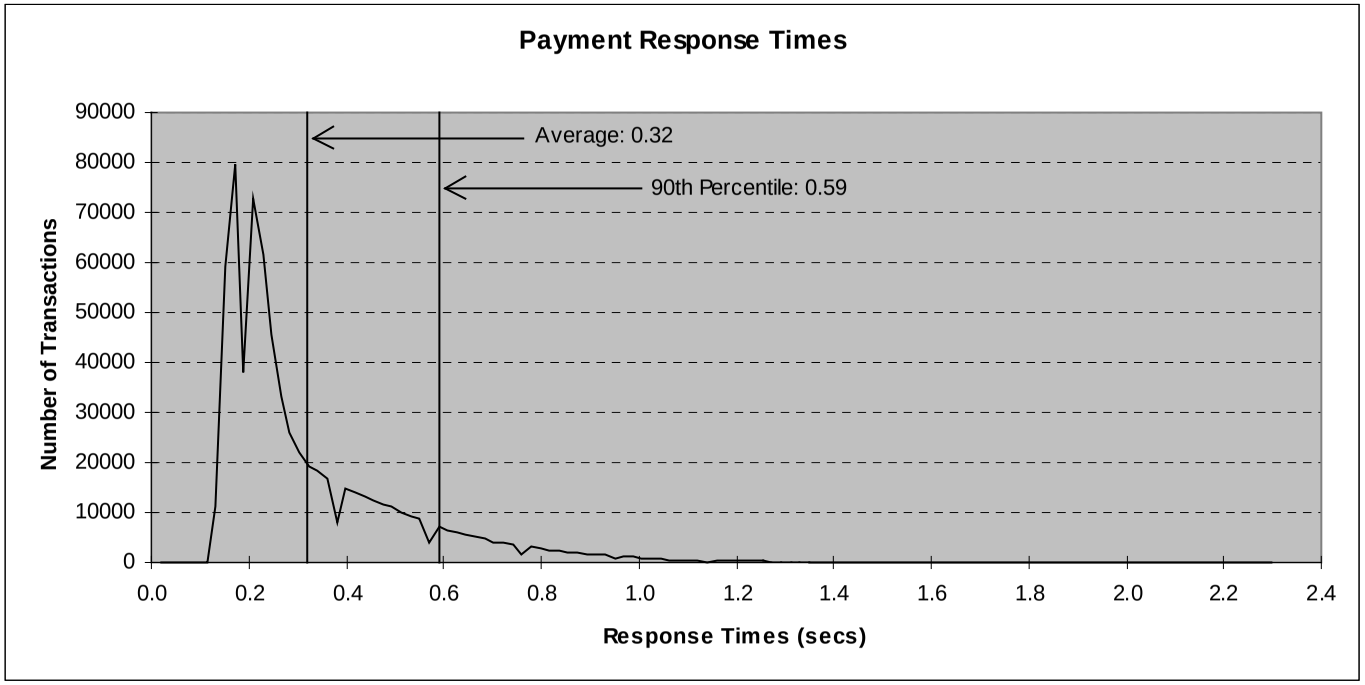


Figure 5.3: Order Status Response Time Distribution

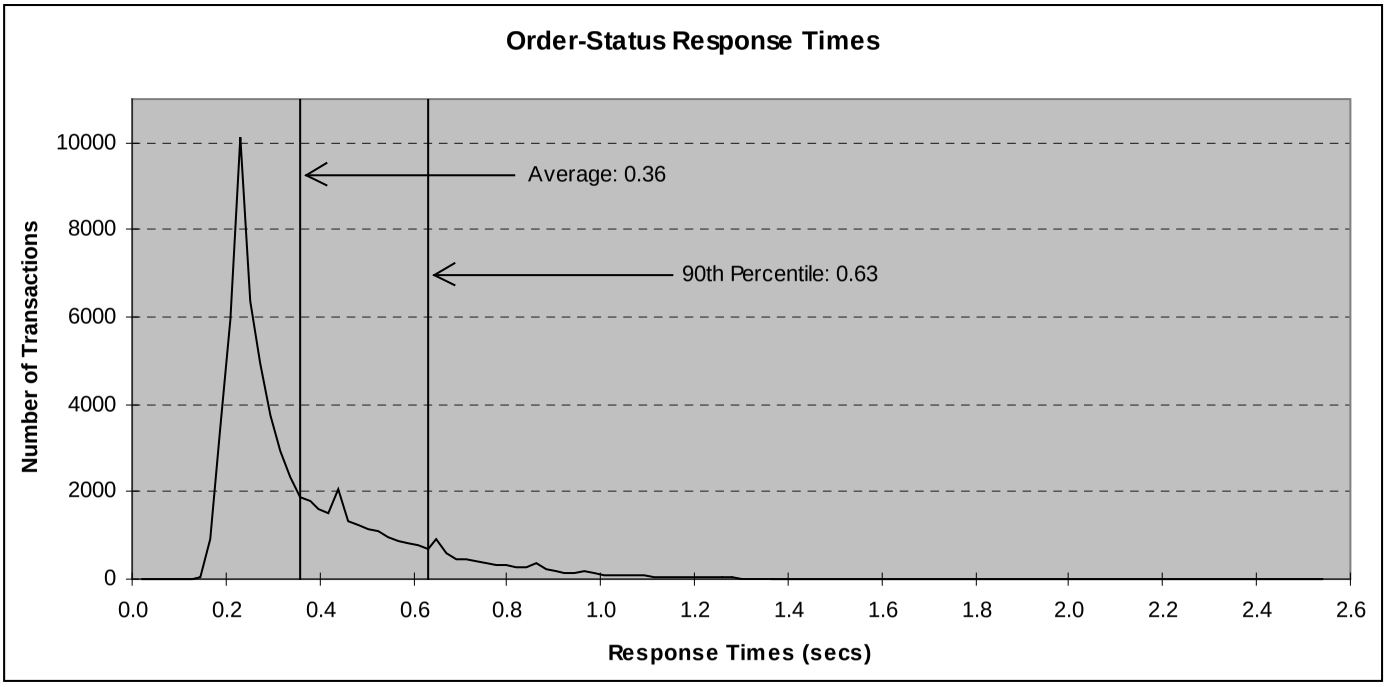


Figure 5.4: Delivery Response Time Distribution

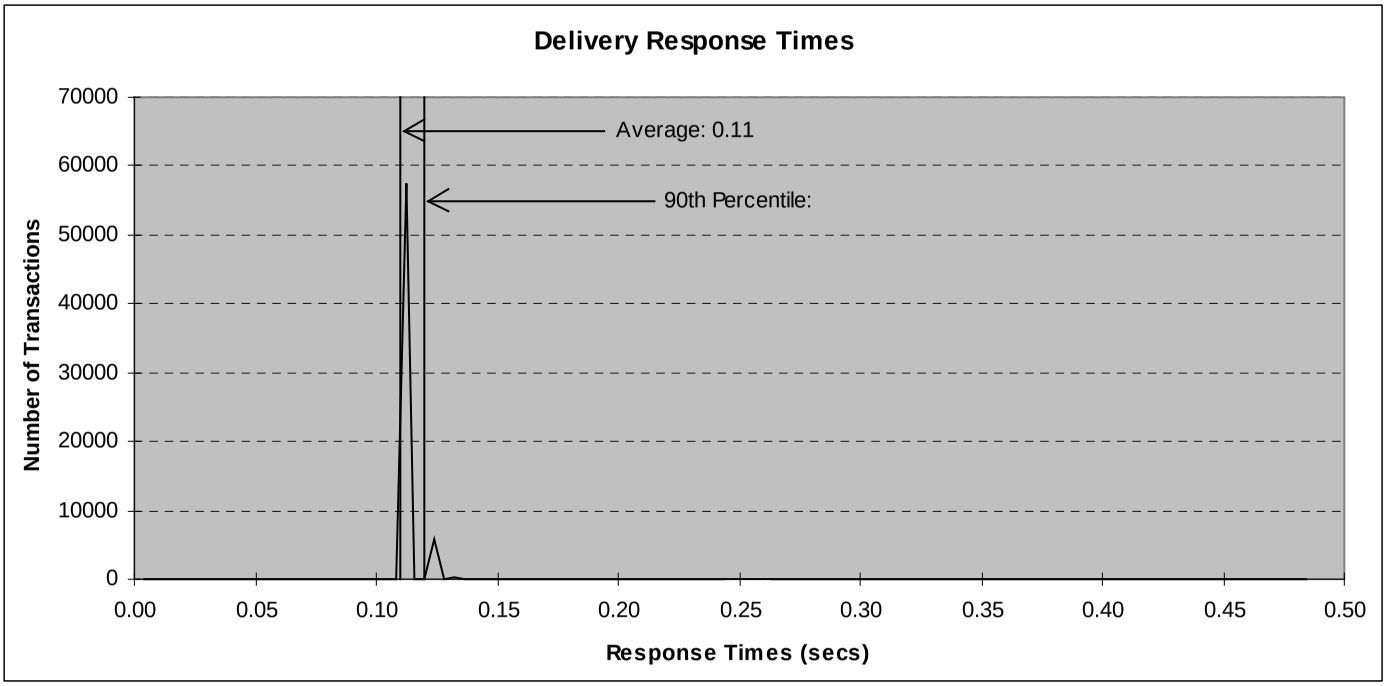
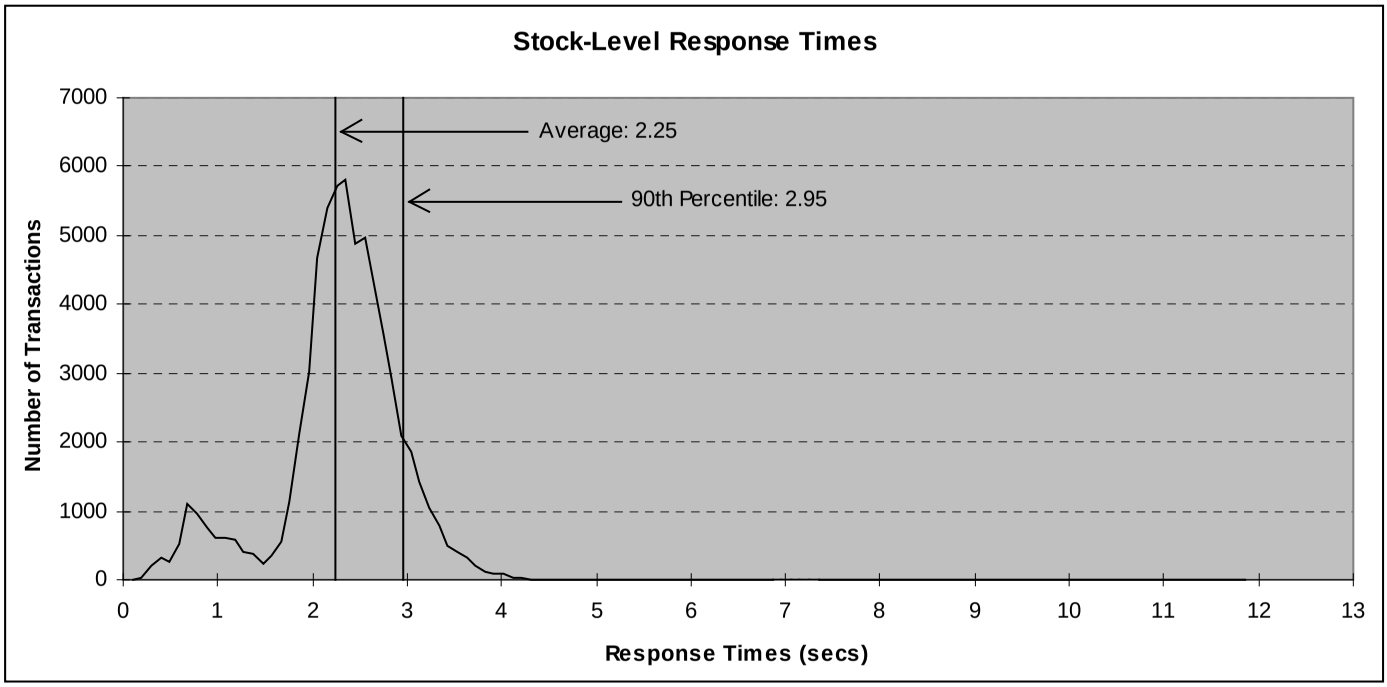


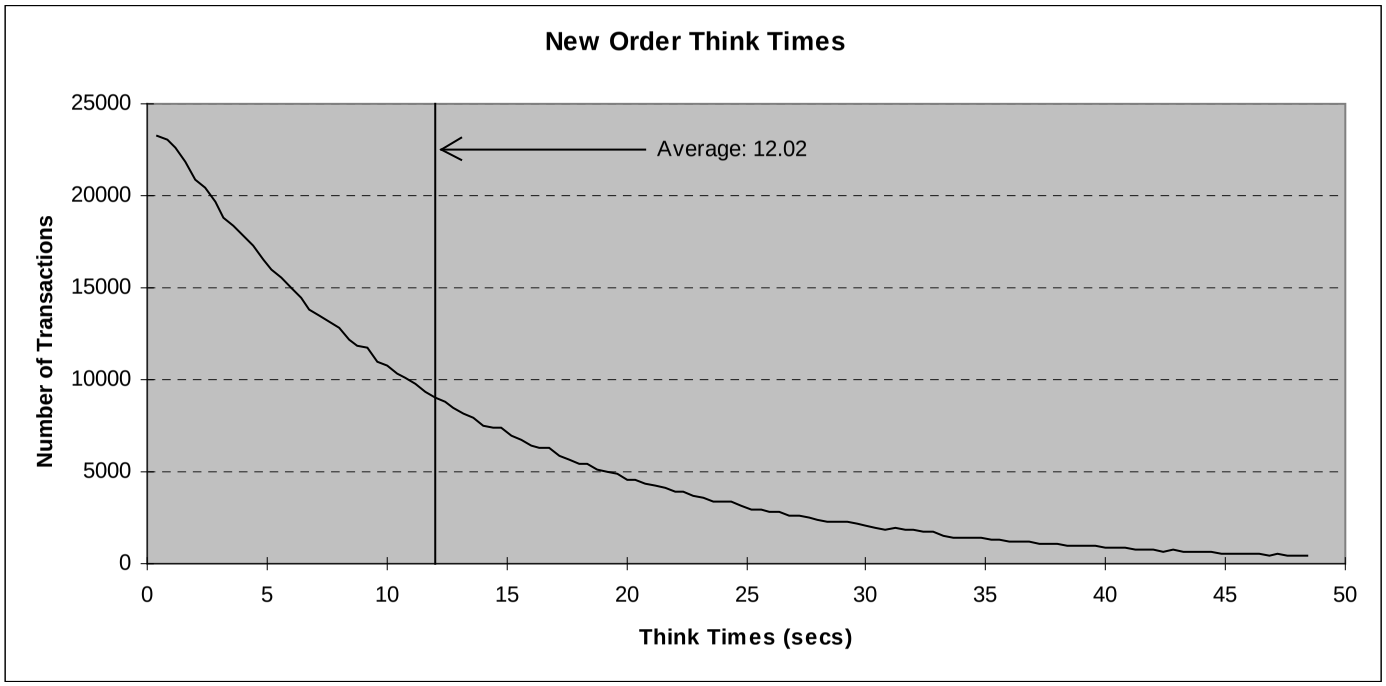
Figure 5.5: Stock Level Response Time Distribution



5.5. New Order Think Time Frequency Distribution Curve

Think Time frequency distribution curve (see Clause 5.6.3) must be reported for the New-Order transaction.

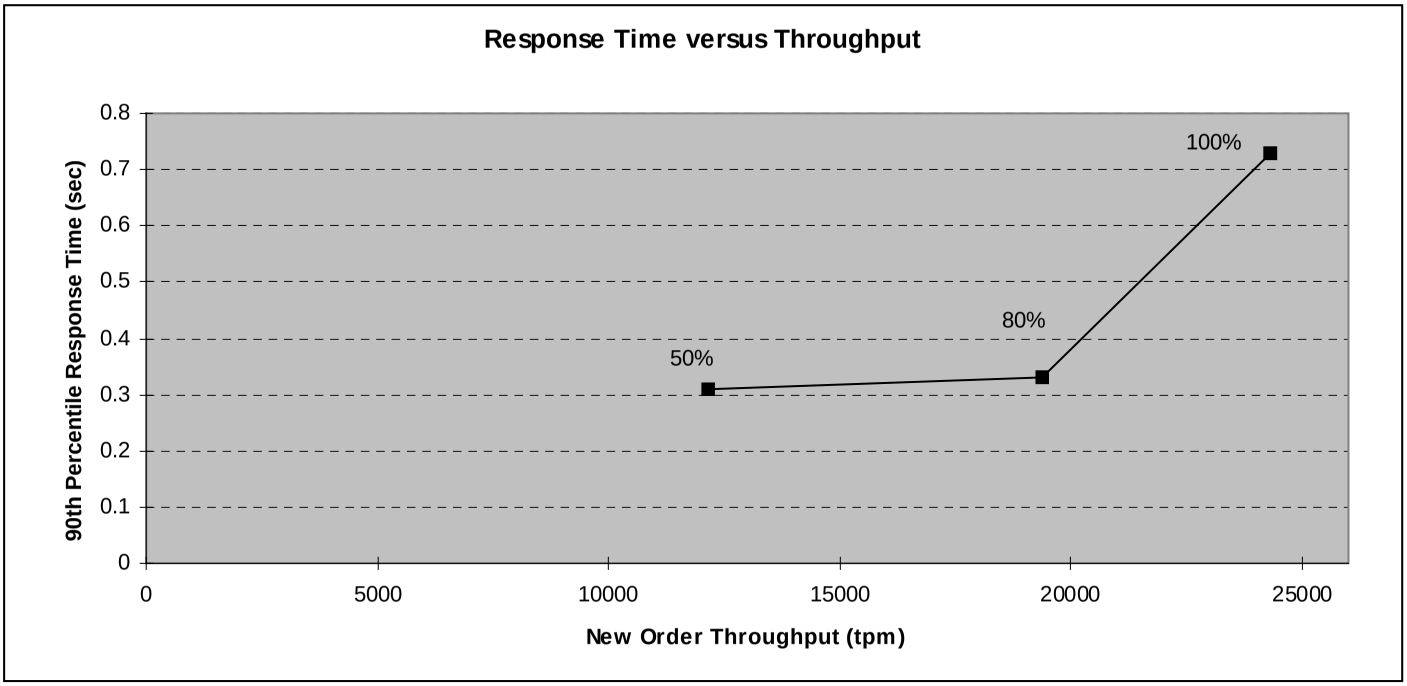
Figure 5.6: New Order Think Time Distribution



5.6. Response Time versus Throughput Performance Curve

The performance curve for response times versus throughput (Clause 5.6.2) must be reported for the New-Order transaction

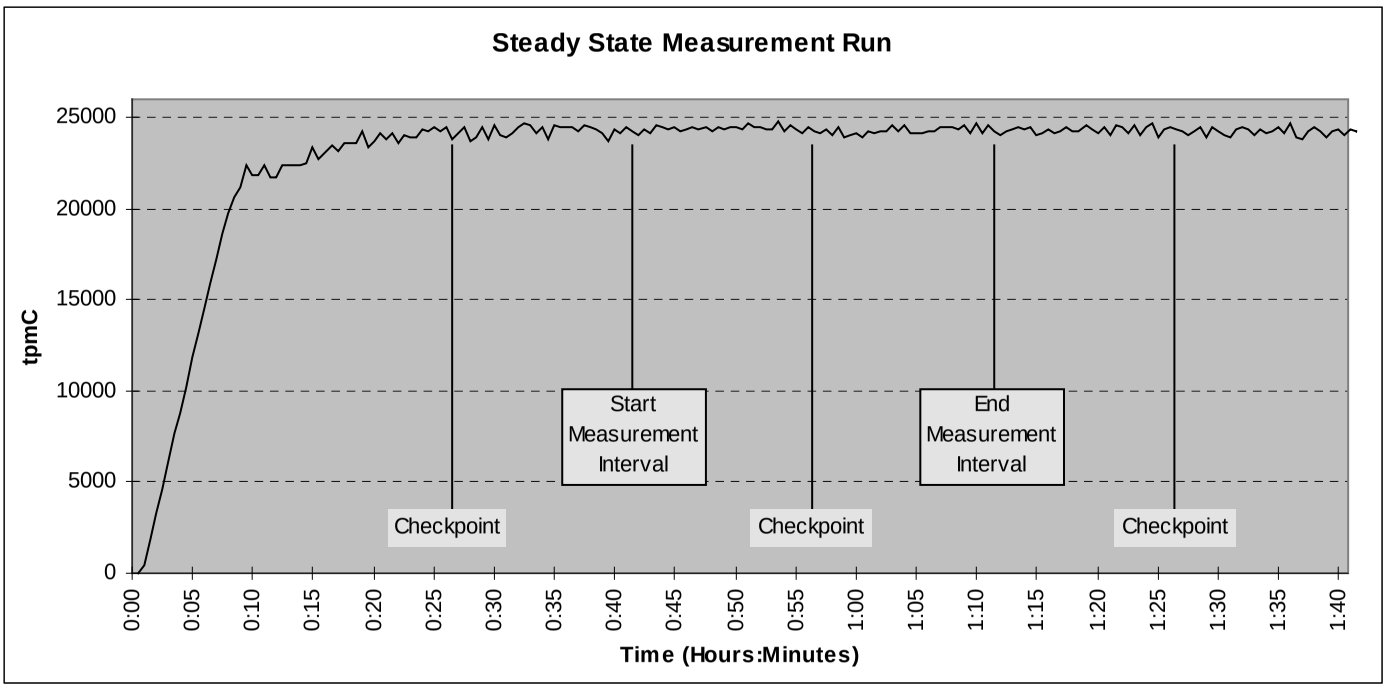
Figure 5.7: Response Time versus Throughput



5.7. New-Order Throughput vs. Time

A graph of throughput versus elapsed time (Clause 5.6.5) must be reported for the New-Order transaction.

Figure 5.8: Throughput (tpmC) versus Time



5.8. Determination of "Steady State"

The method used to determine that the SUT had reached a steady state prior to commencing the measurement interval (see Clause 5.5) must be described.

The transaction throughput rate (tpmC) and response time were relatively constant after the initial 'ramp up' period. The throughput and response time behavior were determined by examining data reported for each 30-second interval over the duration of the benchmark. Ramp-up and steady state are discernible in the graph presented in Figure 5.8.

5.9. Work Performed During Steady State

A description of how the work normally performed during a sustained test (for example checkpointing, writing redo/undo log records, etc.) actually occurred during the measurement interval must be reported.

The RTE selects a transaction type from the menu and prepares to request the appropriate blank form. A timestamp is taken before the form request is sent and after the response is returned. The difference between the two is saved off as the menu response time. The RTE then generates input data for the transaction to create a completed form and waits the appropriate key time. A timestamp is taken before the completed form is sent and after the response is returned. The difference between these two is saved off as the transaction response time. Both response times are padded with a 0.1 second delay per spec to account for the web browser delay. The appropriate transaction data and response times are logged and the RTE waits the required think time interval before repeating the process. Each RTE driver maintains its own log file. Log file contents are consolidated for the reports.

The RTE emulates web browsers (not terminals) in this client-server implementation. The RTE sends and receives HTML formatted data using HTTP through Ethernet LANs to a client application running on the client machine. The client application processes the request, sends the transaction to a Tuxedo TPC-C application server queue, waits for the transaction response (except for delivery), and returns an appropriately formatted HTML form back to the (emulated) web browser (RTE). The Tuxedo TPC-C application server retrieves a message from its queue, invokes request processing via a stored procedure on the database server using Microsoft SQL Server DBLIB and RPC through sockets over another Ethernet LAN, accepts the response, and returns a result to the client application (via Tuxedo). For delivery transactions, the client application does not wait for the Tuxedo TPC-C delivery server to respond. Each delivery server logs its results to its own file. The delivery report files are consolidated for reports.

To perform checkpoints at specific intervals, SQL Server's checkpoint interval was set to the maximum allowable value and a utility was written to schedule checkpoints at parameter-specified intervals and record the start and end time of each checkpoint. The checkpoint script was started manually on one of the client machines after the RTE had all users logged in and sending transactions and a steady state had been achieved. Using this information, the positioning of the checkpoint within the measurement interval was verified to be clear of the guard zones.

At each checkpoint, SQL Server wrote to disk all database pages in memory that had been updated but not yet physically written to the disk. Upon completion of the checkpoint, SQL Server also wrote records to the transaction log indicating that a checkpoint had completed.

5.10. Reproducibility

A description of the method used to determine the reproducibility of the measurement results must be reported.

In a repeat test, carried out in the same manner as the primary test, a throughput of 24,318.00 tpmC was achieved on the same database during a 30-minute, steady state run. All required transaction statistics were met. See the Auditor's attestation letter for details.

5.11. Measurement Interval Duration

A statement of the duration of the measurement interval for the reported Maximum Qualified Throughput (tpmC) must be included.

The measurement interval was 30 minutes.

5.12. Regulation of Transaction Mix

The method of regulation of the transaction mix (e.g. card decks or weighted random distribution) must be described. If weighted distribution is used and the RTE adjusts the weights associated with each transaction type, the maximum adjustments to the weight from the initial value must be disclosed.

The RTE was given a weighed random distribution which could not be adjusted during the run.

5.13. Transaction Statistics

The percentage of the total mix for each transaction type must be disclosed.

The percentage of New-Order transactions rolled back as a result of invalid item number must be disclosed.

The average number of order-lines entered per New-Order transaction must be disclosed.

The percentage of remote order-lines entered per New-Order transaction must be disclosed.

The percentage of remote Payment transactions must be disclosed.

The percentage of customer selections by customer last name in the Payment and Order-Status transactions must be disclosed.

The percentage of Delivery transactions skipped due to there being fewer than necessary orders in the New-Order table must be disclosed.

Table 5.4 shows this information.

Table 5.4: Transaction Statistics

Transaction Type	Statistics	Value
New Order	Rolledback transactions	1.01%
	Home warehouse	99.00%
	Remote warehouse	1.00%
	Average Items per Order	10.00
Payment	Home warehouse	85.04%
	Remote warehouse	14.96%
	Non-primary key access	59.97%
Order Status	Non-primary key access	59.95%
Delivery	Skipped transactions (Interactive)	0
	Skipped transaction counts (Deferred)	0
	Skipped District counts (Deferred)	0
Transaction Mix	New Order	44.92%
	Payment	43.02%
	Delivery	4.00%
	Stock-Level	4.03%
	Order-Status	4.03%

5.14. Checkpoint Statistics

The number of checkpoints in the measurement interval, the time in seconds from the start of the measurement interval to the first checkpoint, and the Checkpoint Interval must be disclosed.

There is one checkpoint in the measurement interval. The checkpoint starts 902 seconds into the measurement interval. The checkpoint interval is 30 minutes (from the start of one to the start of the next) and a checkpoint lasts approximately 5.7 minutes. In conformance with Clause 5.2.2 there is no checkpoint within a span of 7.5 minutes before or after the beginning or end of the measurement interval.

6. Clause 6: SUT, Driver & Communications Definition

6.1. Remote Terminal Emulator (RTE) Description

The RTE input parameters, code fragments, functions, etc. used to generate each transaction input field must be disclosed.

The RTE used is proprietary to Unisys. Appendix D contains the profile used as input to this RTE.

6.2. Emulated Components

It must be demonstrated that the functionality and performance of the components being emulated in the Driver System are equivalent to that of the priced system.

There were no emulated components in the benchmark configuration other than the emulated web browsers on the users' PCs.

6.3. Functional Diagrams

A complete functional diagram of both benchmark and the configuration of the proposed (target) system must be disclosed. A detailed list of all hardware and software functionality being performed on the Driver System and its interface to the SUT must be disclosed.

Section 0.7 describes and shows functional diagrams of the benchmarked and priced systems.

6.4. Network Configuration

The network configuration of both the tested and proposed (target) services which are being represented and a thorough explanation of exactly which parts are being replaced with the Driver System must be disclosed.

Figures 0.1 and 0.2 in Section 0.7 also diagram the network configurations of the benchmark and configured systems and represent the RTEs connected via LAN replacing the user PCs that are directly connected via LAN.

6.5. Network Bandwidth

The bandwidth of the network(s) used in the tested/priced configuration must be disclosed.

Ethernet local area networks (LAN) are used in the priced and tested configurations. The database server (SUT) contains a single 10/100 megabit per second LAN adapter connecting it to the client systems. This LAN segment is run at 100 megabits per second in both the priced and tested configuration. A full-duplex switch is used to connect the server and the clients.

Each client contains five 10/100 megabit per second LAN adapters and one quad LAN adapter that supports four 10/100 megabit per second LAN segments. One 10/100 megabit per second LAN adapter connects to a LAN segment

that communicates with the SUT at 100 megabits per second in both the priced and tested configuration. The remaining eight LAN segments were run at 10 megabits per second in both the priced and tested configurations

In the priced configuration, each client is connected to workstations (PCs running web browsers) spread over eight 10 megabit per second LAN segments.

In the tested configuration, each client is connected to RTE driver systems emulating web browsers spread over eight 10 megabit per second LAN segments.

6.6. Operator Intervention

If the configuration requires operator intervention (see Clause 6.6.6), the mechanism and the frequency of this intervention must be disclosed.

No operator intervention was required to sustain eight hours of operation at the reported throughput.

7. Clause 7: Pricing

7.1. Pricing

A detailed list of hardware and software used in the priced system must be reported. Each separately orderable item must have vendor part number, description, and release/revision level, and either general availability status or committed delivery date. If package-pricing is used, vendor part number of the package and a description uniquely identifying each of the components of the package must be disclosed. Pricing source(s) and effective date(s) must also be reported.

The total 5-year price of the entire configuration must be reported, including: hardware, software, and maintenance charges. Separate component pricing is recommended. The basis of all discounts used must be disclosed.

System pricing should include subtotals for the following components: Server Hardware, Server Software, Client Hardware, Client Software, and Network Components used for terminal connection (see Clause 7.2.2.3). Clause 6.1 describes the Server and Client components.

System pricing must include line item indication where non-sponsoring companies' brands are used. System pricing must also include line item indication of third party pricing.

A detailed list of hardware and software components along with their part numbers and prices are given in the Executive Summary near the beginning of this document.

7.1.1. System Pricing

Each priced configuration consists of an integrated system package, additional options, and components. Prices for all products are US list prices. A three year warranty is standard with this class of Unisys server products.

7.1.2. Maintenance Pricing

The five year support pricing for Unisys Corporation Open Business Server products is based on a 36-month warranty on hardware, upgraded to service level Performance-Gold, plus an additional 24 months of support at service level Performance-Gold. Microsoft and BEA support pricing is based on 5 years of annual support costs.

Unisys Corporation Standard Performance-Gold Support: four hour maximum response, onsite support for hardware provides service from 8:00 A.M. to 5:00 P.M., Monday through Friday. Service requests made as late as 5:00 P.M. will receive a response the same day.

Server disks are covered by Western Micro's 5 year, seven day return-to-factory warranty, and appropriate spares are included in the priced configuration. American Megatrend's 3 year, seven day return-to-factory warranty is extended to 5 years, and appropriate spares and upgrade price are included in the priced configuration. Netlux and Sofware House International provide 5 year, seven day return-to-factory warranties, and appropriate spares are included in the priced configuration.

7.1.3. Discounts

Unisys provides a standard pre-pay discount for maintenance service of the client, server and storage components of the priced configuration.

Western Micro provides a standard dollar-volume discount to the client, server and storage components of the priced configuration.

7.2. Availability

The committed delivery date for general availability (availability date) of products used in the price calculation must be reported. When the priced system includes products with different availability dates, the reported availability date for the priced system must be the date at which all components are committed to be available.

The hardware, software and support/maintenance products priced in this benchmark are detailed on page vi.

All components are available now.

7.3. Measured tpmC, Price/Performance, and Availability Date

A statement of the measured tpmC as well as the respective calculations for the 5-year pricing, price/performance (price/tpmC), and the availability date must be included.

The measured tpmC, pricing calculations, price/performance, and availability are shown on pages v and vi.

7.4. Country-Specific Pricing

Additional Clause 7 related items may be included in the Full Disclosure Report for each country specific priced configuration. Country specific pricing is subject to Clause 7.1.7.

None.

7.5. Usage Pricing

For any usage pricing, the sponsor must disclose:

- *Usage level at which the component was priced.*
- *A statement of the company policy allowing such pricing.*

The component pricing based on usage is shown below:

- One (1) Microsoft Windows NT Server Enterprise Edition 4.0 license
- One (1) Microsoft SQL Server Enterprise Edition 7.0 license
- Three (3) Microsoft Windows NT Server 4.0 Licenses
- One (1) Microsoft Visual C++ Professional 5.0
- Three (3) BEA Tuxedo 6.3 CFS for NT licenses

Microsoft SQL Server & Internet Information Server and BEA Tuxedo were priced for an unlimited number of users.

8. Clause 8 : Full Disclosure Availability

8.1. Availability

The Full Disclosure Report must be readily available to the public at a reasonable charge, similar to charges for similar documents by that test sponsor.

Copies of this Full Disclosure Report may be downloaded from the Transaction Processing Performance Council web site at www.tpc.org or obtained by contacting:

TPC Benchmark Administrator
Systems Analysis, Modeling & Measurement Group
Unisys Corporation, M/S 262
25725 Jeronimo Road
Mission Viejo, CA 92691
USA

9. *Clause 9 : Audit*

9.1. Auditor's Report

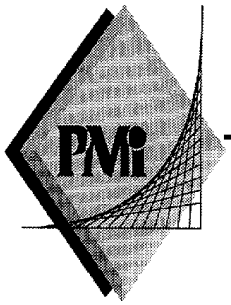
The auditor's name, address, phone number and a copy of the auditor's attestation letter indicating compliance must be included in the Full Disclosure Report.

This implementation of the TPC Benchmark C on the Unisys Aquanta ES5045 Server was audited by Tom Sawyer, a TPC certified auditor of:

Performance Metrics Inc.,
2229 Benita Drive, Suite 101,
Rancho Cordova, CA 95670.

(916) 635-2822 Fax: (916) 858-0109
e-mail: Lorna@PerfMetrics.com

The attestation letter is shown on the next 2 pages.



PERFORMANCE METRICS INC.
TPC Certified Auditors

March 5, 1999

Jerrold Buggert
Director of Modeling and Measurement
Unisys Corporation
25725 Jeronimo Road
Mission Viejo, CA 92691

I have verified the TPC Benchmark™ C client/server for the following configuration:

Platform:	Unisys Aquanta ES5045 Server
Database Manager:	Microsoft SQL Server Enterprise Edition 7.0
Operating System:	Microsoft Windows NT Server Enterprise Edition 4.0 (SP4)
Transaction Manager:	BEA TUXEDO CFS 6.3 for NT

Server: Aquanta ES5045 Server				
CPU's	Memory	Disks	90% Response	tpmC
4 Pentium III Xeon @ 500 Mhz	Main: 4 GB Cache: 2MB each	57 @ 4.3 GB 168 @ 9.1 GB 8 @ 17.09 GB	**0.73 sec**	**24,328.67**
3 Clients: NetServer LC3				
2 Pentium II @ 450 MHz	Main: 512 MB Cache: 512K	1 @ 3.97 GB	na	na

In my opinion, these performance results were produced in compliance with the TPC requirements for the benchmark. The following attributes of the benchmark were given special attention:

- The transactions were correctly implemented.
- The database was properly sized and populated.
- The database was properly scaled with 1,968 warehouses. Only 1,948 warehouses were used during measurement. The unused warehouse rows were deleted.
- The ACID properties were met.

2229 Benita Dr. Suite 101, Rancho Cordova, CA 95670
(916) 635-2822 fax: (916) 858-0109 email: Lorna@PerfMetrics.com

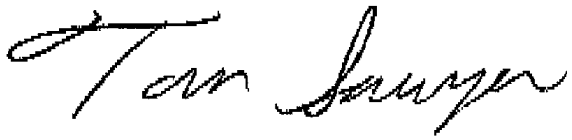
- The durability data loss and log loss tests were performed on a 10-warehouse database.
- Input data was generated according to the specified percentages.
- Eight hours of mirrored log space was configured on the measured system system.
- Eight hours of dynamic table growth space was configured on the measured system.
- The 180-day space calculation was verified. The measured configuration has sufficient storage to satisfy this requirement.
- Measurement cycle times included a 0.1 second menu and a 0.1 second response time delay for an emulated Web browser.
- There were 19,480 user contexts present on the system.
- Each emulated user started with a different random number seed.
- The NURand constants used for database load and at run time were verified.
- The steady state portion of the test was 30 minutes.
- One checkpoint was taken before the measured interval.
- One checkpoint was taken during the measured interval.
- The checkpoints were verified to be clear of the guard zone.
- The system pricing was checked for major components and maintenance.

Auditor Notes:

None

Sincerely,

Tom Sawyer



Auditor

2229 Benita Dr. Suite 101, Rancho Cordova, CA 95670
(916) 635-2822 fax: (916) 858-0109 email: Lorna@PerfMetrics.com

Appendix A - Client/Server Source

CLIENT MAKEFILE

```
# Microsoft Developer Studio Generated NMAKE File, Format Version 4.20
# ** DO NOT EDIT **

# TARGTYPE "Win32 (x86) Dynamic-Link Library" 0x0102

!IF "$(CFG)" == ""
CFG=tpcc - Win32 Debug
!MESSAGE No configuration specified.  Defaulting to tpcc - Win32 Debug.
!ENDIF

!IF "$(CFG)" != "tpcc - Win32 Release" && "$(CFG)" != "tpcc - Win32 Debug"
!MESSAGE Invalid configuration "$(CFG)" specified.
!MESSAGE You can specify a configuration when running NMAKE on this
makefile
!MESSAGE by defining the macro CFG on the command line.  For example:
!MESSAGE
!MESSAGE NMAKE /f "tpcc.mak" CFG="tpcc - Win32 Debug"
!MESSAGE
!MESSAGE Possible choices for configuration are:
!MESSAGE
!MESSAGE "tpcc - Win32 Release" (based on "Win32 (x86) Dynamic-Link
Library")
!MESSAGE "tpcc - Win32 Debug" (based on "Win32 (x86) Dynamic-Link
Library")
!MESSAGE
!ERROR An invalid configuration is specified.
!ENDIF

!IF "$(OS)" == "Windows_NT"
NULL=
!ELSE
NULL=nul
!ENDIF
################################################################################
######
# Begin Project
# PROP Target_Last_Scanned "tpcc - Win32 Release"
CPP=cl.exe
RSC=rc.exe
MTL=mktyplib.exe

!IF  "$(CFG)" == "tpcc - Win32 Release"

# PROP BASE Use_MFC 0
# PROP BASE Use_Debug_Libraries 0
# PROP BASE Output_Dir "Release"
# PROP BASE Intermediate_Dir "Release"
# PROP BASE Target_Dir ""
# PROP Use_MFC 0
# PROP Use_Debug_Libraries 0
# PROP Output_Dir "Release"
# PROP Intermediate_Dir "Release"
# PROP Target_Dir ""
OUTDIR=.\Release
INTDIR=.\Release

ALL : "$(OUTDIR)\tpcc.dll"

CLEAN :
       -@erase "$(INTDIR)\diagio.obj"
       -@erase "$(INTDIR)\term.obj"
       -@erase "$(INTDIR)\timesupp.obj"
       -@erase "$(INTDIR)\tmon.obj"
       -@erase "$(INTDIR)\TPCC.OBJ"
       -@erase "$(INTDIR)\tpcchandler.obj"
       -@erase "$(OUTDIR)\tpcc.dll"
       -@erase "$(OUTDIR)\tpcc.exp"
       -@erase "$(OUTDIR)\tpcc.lib"

"$(OUTDIR)" :
    if not exist "$(OUTDIR)/$(NULL)" mkdir "$(OUTDIR)"

# ADD BASE CPP /nologo /MT /W3 /GX /O2 /D "WIN32" /D "NDEBUG" /D
"_WINDOWS" /YX /c
# ADD CPP /nologo /MT /W3 /GX /O2 /D "WIN32" /D "NDEBUG" /D "_WINDOWS" /YX
/c
CPP_PROJ=/nologo /MT /W3 /GX /O2 /D "WIN32" /D "NDEBUG" /D "_WINDOWS"\
 /Fp"$(INTDIR)/tpcc.pch" /YX /Fo"$(INTDIR)/" /c
CPP_OBJS=.\Release/
CPP_SBRS=.\.
# ADD BASE MTL /nologo /D "NDEBUG" /win32
# ADD MTL /nologo /D "NDEBUG" /win32
MTL_PROJ=/nologo /D "NDEBUG" /win32
# ADD BASE RSC /l 0x409 /d "NDEBUG"
# ADD RSC /l 0x409 /d "NDEBUG"
BSC32=bscmake.exe
# ADD BASE BSC32 /nologo
# ADD BSC32 /nologo
BSC32_FLAGS=/nologo /o"$(OUTDIR)/tpcc.bsc"
BSC32_SBRS= \

LINK32=link.exe
# ADD BASE LINK32 kernel32.lib user32.lib gdi32.lib winspool.lib
comdlg32.lib advapi32.lib shell32.lib ole32.lib oleaut32.lib uuid.lib
odbc32.lib odbccp32.lib /nologo /subsystem:windows /dll /machine:I386
# ADD LINK32 kernel32.lib user32.lib gdi32.lib winspool.lib comdlg32.lib
advapi32.lib shell32.lib ole32.lib oleaut32.lib uuid.lib odbc32.lib
odbccp32.lib libtux.lib libbuft.lib libtux2.lib libfml.lib libfml32.lib
libgp.lib /nologo /subsystem:windows /dll /machine:I386
# SUBTRACT LINK32 /verbose /nodefaultlib
LINK32_FLAGS=kernel32.lib user32.lib gdi32.lib winspool.lib comdlg32.lib\
 advapi32.lib shell32.lib ole32.lib oleaut32.lib uuid.lib odbc32.lib\
 odbccp32.lib libtux.lib libbuft.lib libtux2.lib libfml.lib libfml32.lib\
 libgp.lib /nologo /subsystem:windows /dll /incremental:no\
 /pdb:"$(OUTDIR)/tpcc.pdb" /machine:I386 /def:".\tpcc.def"\
 /out:"$(OUTDIR)/tpcc.dll" /implib:"$(OUTDIR)/tpcc.lib"
DEF_FILE= \
```

```
        ".\tpcc.def"
LINK32_OBJS= \
        "$(INTDIR)\diagio.obj" \
        "$(INTDIR)\term.obj" \
        "$(INTDIR)\timesupp.obj" \
        "$(INTDIR)\tmon.obj" \
        "$(INTDIR)\TPCC.OBJ" \
        "$(INTDIR)\tpcchandler.obj"

"$(OUTDIR)\tpcc.dll" : "$(OUTDIR)" $(DEF_FILE) $(LINK32_OBJS)
    $(LINK32) @<<
  $(LINK32_FLAGS) $(LINK32_OBJS)
<<

!ELSEIF  "$(CFG)" == "tpcc - Win32 Debug"

# PROP BASE Use_MFC 0
# PROP BASE Use_Debug_Libraries 1
# PROP BASE Output_Dir "Debug"
# PROP BASE Intermediate_Dir "Debug"
# PROP BASE Target_Dir ""
# PROP Use_MFC 0
# PROP Use_Debug_Libraries 1
# PROP Output_Dir "Debug"
# PROP Intermediate_Dir "Debug"
# PROP Target_Dir ""
OUTDIR=.\Debug
INTDIR=.\Debug

ALL : "$(OUTDIR)\tpcc.dll"

CLEAN :
        -@erase "$(INTDIR)\diagio.obj"
        -@erase "$(INTDIR)\term.obj"
        -@erase "$(INTDIR)\timesupp.obj"
        -@erase "$(INTDIR)\tmon.obj"
        -@erase "$(INTDIR)\TPCC.OBJ"
        -@erase "$(INTDIR)\tpcchandler.obj"
        -@erase "$(INTDIR)\vc40.idb"
        -@erase "$(INTDIR)\vc40.pdb"
        -@erase "$(OUTDIR)\tpcc.dll"
        -@erase "$(OUTDIR)\tpcc.exp"
        -@erase "$(OUTDIR)\tpcc.ilk"
        -@erase "$(OUTDIR)\tpcc.lib"
        -@erase "$(OUTDIR)\tpcc.pdb"

"$(OUTDIR)" :
    if not exist "$(OUTDIR)/$(NULL)" mkdir "$(OUTDIR)"

# ADD BASE CPP /nologo /MTd /W3 /Gm /GX /Zi /Od /D "WIN32" /D "_DEBUG" /D
"_WINDOWS" /YX /c
# ADD CPP /nologo /MT /W3 /Gm /GX /Zi /Od /D "WIN32" /D "_DEBUG" /D
"_WINDOWS" /YX /c
CPP_PROJ=/nologo /MT /W3 /Gm /GX /Zi /Od /D "WIN32" /D "_DEBUG" /D
"_WINDOWS"\
 /Fp"$(INTDIR)/tpcc.pch" /YX /Fo"$(INTDIR)/" /Fd"$(INTDIR)/" /c
CPP_OBJS=.\Debug/
CPP_SBRS=.\.
# ADD BASE MTL /nologo /D "_DEBUG" /win32
# ADD MTL /nologo /D "_DEBUG" /win32
MTL_PROJ=/nologo /D "_DEBUG" /win32
# ADD BASE RSC /l 0x409 /d "_DEBUG"
# ADD RSC /l 0x409 /d "_DEBUG"
BSC32=bscmake.exe
# ADD BASE BSC32 /nologo
# ADD BSC32 /nologo
BSC32_FLAGS=/nologo /o"$(OUTDIR)/tpcc.bsc"
BSC32_SBRS= \

LINK32=link.exe
# ADD BASE LINK32 kernel32.lib user32.lib gdi32.lib winspool.lib
comdlg32.lib advapi32.lib shell32.lib ole32.lib oleaut32.lib uuid.lib
odbc32.lib odbccp32.lib /nologo /subsystem:windows /dll /debug
/machine:I386
# ADD LINK32 kernel32.lib user32.lib gdi32.lib winspool.lib comdlg32.lib
advapi32.lib shell32.lib ole32.lib oleaut32.lib uuid.lib odbc32.lib
odbccp32.lib libtux.lib libbuft.lib libtux2.lib libfml.lib libfml32.lib
libgp.lib /nologo /subsystem:windows /dll /debug /machine:I386
# SUBTRACT LINK32 /verbose /nodefaultlib
LINK32_FLAGS=kernel32.lib user32.lib gdi32.lib winspool.lib comdlg32.lib\
 advapi32.lib shell32.lib ole32.lib oleaut32.lib uuid.lib odbc32.lib\
 odbccp32.lib libtux.lib libbuft.lib libtux2.lib libfml.lib libfml32.lib\
 libgp.lib /nologo /subsystem:windows /dll /incremental:yes\
 /pdb:"$(OUTDIR)/tpcc.pdb" /debug /machine:I386 /def:".\tpcc.def"\
 /out:"$(OUTDIR)/tpcc.dll" /implib:"$(OUTDIR)/tpcc.lib"
DEF_FILE= \
        ".\tpcc.def"
LINK32_OBJS= \
        "$(INTDIR)\diagio.obj" \
        "$(INTDIR)\term.obj" \
        "$(INTDIR)\timesupp.obj" \
        "$(INTDIR)\tmon.obj" \
        "$(INTDIR)\TPCC.OBJ" \
        "$(INTDIR)\tpcchandler.obj"

"$(OUTDIR)\tpcc.dll" : "$(OUTDIR)" $(DEF_FILE) $(LINK32_OBJS)
    $(LINK32) @<<
  $(LINK32_FLAGS) $(LINK32_OBJS)
<<

!ENDIF

.c{$(CPP_OBJS)}.obj:
   $(CPP) $(CPP_PROJ) $<

.cpp{$(CPP_OBJS)}.obj:
   $(CPP) $(CPP_PROJ) $<

.cxx{$(CPP_OBJS)}.obj:
   $(CPP) $(CPP_PROJ) $<

.c{$(CPP_SBRS)}.sbr:
   $(CPP) $(CPP_PROJ) $<

.cpp{$(CPP_SBRS)}.sbr:
   $(CPP) $(CPP_PROJ) $<

.cxx{$(CPP_SBRS)}.sbr:
   $(CPP) $(CPP_PROJ) $<

################################################################################
######
```

```
# Begin Target

# Name "tpcc - Win32 Release"
# Name "tpcc - Win32 Debug"

!IF  "$(CFG)" == "tpcc - Win32 Release"

!ELSEIF  "$(CFG)" == "tpcc - Win32 Debug"

!ENDIF

################################################################################
######
# Begin Source File

SOURCE=.\term.c
DEP_CPP_TERM_=\
        ".\diagio.h"\
        ".\term.h"\
        ".\timesupp.h"\


"$(INTDIR)\term.obj" : $(SOURCE) $(DEP_CPP_TERM_) "$(INTDIR)"


# End Source File
################################################################################
######
# Begin Source File

SOURCE=.\timesupp.c
DEP_CPP_TIMES=\
        ".\timesupp.h"\


"$(INTDIR)\timesupp.obj" : $(SOURCE) $(DEP_CPP_TIMES) "$(INTDIR)"


# End Source File
################################################################################
######
# Begin Source File

SOURCE=.\TPCC.C
DEP_CPP_TPCC_=\
        ".\diagio.h"\
        ".\term.h"\
        ".\tmon.h"\
        ".\tpcc.h"\
        ".\tpcchandler.h"\


"$(INTDIR)\TPCC.OBJ" : $(SOURCE) $(DEP_CPP_TPCC_) "$(INTDIR)"


# End Source File
################################################################################
######
# Begin Source File

SOURCE=.\tpcchandler.c

DEP_CPP_TPCCH=\
        ".\diagio.h"\
        ".\term.h"\
        ".\tmon.h"\
        ".\tpcc.h"\
        ".\tpcchandler.h"\


"$(INTDIR)\tpcchandler.obj" : $(SOURCE) $(DEP_CPP_TPCCH) "$(INTDIR)"


# End Source File
################################################################################
######
# Begin Source File

SOURCE=.\tpcc.def

!IF  "$(CFG)" == "tpcc - Win32 Release"

!ELSEIF  "$(CFG)" == "tpcc - Win32 Debug"

!ENDIF

# End Source File
################################################################################
######
# Begin Source File

SOURCE=.\tmon.c
DEP_CPP_TMON_=\
        ".\tmon.h"\
        {$(INCLUDE)}"\atmi.h"\
        {$(INCLUDE)}"\sys\types.h"\
        {$(INCLUDE)}"\tmenv.h"\


"$(INTDIR)\tmon.obj" : $(SOURCE) $(DEP_CPP_TMON_) "$(INTDIR)"


# End Source File
################################################################################
######
# Begin Source File

SOURCE=.\diagio.c
DEP_CPP_DIAGI=\
        ".\diagio.h"\


"$(INTDIR)\diagio.obj" : $(SOURCE) $(DEP_CPP_DIAGI) "$(INTDIR)"


# End Source File
# End Target
# End Project
################################################################################
######
```

tpcc.def

```
EXPORTS
   GetExtensionVersion
   HttpExtensionProc
```

tpcc.h

```
// tpcc.h

#include <time.h>

// TPCCHandler return codes
#define TPCCSEND 1
#define TPCCSENDEND 2
#define TPCCENDNOW 3

// TPCC Service return codes
#define SVC_BADITEMID 1
#define SVC_NOERROR 0
#define SVCERR_DEADLOCK -1
#define SVCERR_NOCUSTOMER -2
#define SVCERR_NOORDERS -3
#define SVCERR_DBLIB -4

// Min/Max transaction data definitions
#define MIN_DId 1
#define MAX_DId 10
#define MIN_OL 5
#define MAX_OL 15
#define MIN_QUANTITY 1
#define MAX_QUANTITY 10
#define MIN_ITEM_ID 1
#define MAX_ITEM_ID 100000
#define MIN_CUST_ID 1
#define MAX_CUST_ID 3000
#define MIN_CARRIER 1
#define MAX_CARRIER 10
#define MIN_THRESHOLD 10
#define MAX_THRESHOLD 20

// pTPCC->iStatusId codes
#define INVALID_IID              1
#define STATUS_OK                0
#define ERR_CMD_UNKNOWN          -10
#define ERRTXT_CMD_UNKNOWN       "Unrecognized Command"
#define ERR_ALREADY_LOGGEDIN     -11
#define ERRTXT_ALREADY_LOGGEDIN  "Already Logged In"
#define ERR_TERMID               -12
#define ERRTXT_TERMID            "TermId or SyncId in Error"
#define ERR_FORM_UNKNOWN         -13
#define ERRTXT_FORM_UNKNOWN      "Unrecognized FormId"
#define ERR_WID_INVALID          -14
#define ERR_DID_INVALID          -15
#define ERR_MISSING_KEY          -16
#define ERR_NOT_NUMERIC          -17
#define ERR_THRESHOLD_RANGE      -18
#define ERR_EMBEDDED_EMPTY_OL    -19
#define ERR_QUANTITY_INVALID     -20
#define ERR_OL_INVALID           -21
#define ERR_OL_COUNT             -22
#define ERR_TM_INTERFACE         -23
#define ERR_SERVICE_RSLT         -24
#define ERR_INPUT_TOOLONG        -25
#define ERR_IDANDNAME_EMPTY      -26
#define ERR_IDANDNAME_ENTERED    -27
#define ERR_AMOUNT_BADFORM       -28
#define ERR_AMOUNT_INVALID       -29
#define ERR_CARRIER_INVALID      -30
#define ERR_TERM_ALLOC           -31

#define STATUS_LEN 200
#define NAME_LEN 16
#define ADDR_LEN 20
#define STATE_LEN 2
#define ZIP_LEN 9

#define MAX_MSG_SZ  5000
#define CTEXT "Content-length: "
#define HTTPHdr "Connection: keep-alive\r\nContent-type: text/html\r\n" \
                "Content-length:     \r\n\r\n"

typedef struct
{
   int year;
   int quarter;
   int month;
   int dayofyear;
   int day;
   int week;
   int weekday;
   int hour;
   int minute;
   int second;
   int millisecond;
} DBDATEREC;

typedef struct
{
   short ol_supply_w_id;
   long ol_i_id;
   char ol_i_name[25];
   short ol_quantity;
   char ol_brand_generic[2];
   double ol_i_price;
   double ol_amount;
   short ol_stock;
} OL_NEW_ORDER_DATA;

typedef struct
{
   short w_id;
   short d_id;
   long        c_id;
   short o_ol_cnt;
   char c_last[NAME_LEN + 1];
   char c_credit[3];
   double c_discount;
   double w_tax;
   double d_tax;
   long o_id;
```

```
   short o_commit_flag;
   DBDATEREC o_entry_d;
   short o_all_local;
   double total_amount;
   char execution_status[STATUS_LEN];
   OL_NEW_ORDER_DATA Ol[MAX_OL];
} NEW_ORDER_DATA;

typedef struct
{
   short w_id;
   short d_id;
   long c_id;
   short c_d_id;
   short c_w_id;
   double h_amount;
   DBDATEREC h_date;
   char w_street_1[ADDR_LEN + 1];
   char w_street_2[ADDR_LEN + 1];
   char w_city[ADDR_LEN + 1];
   char w_state[STATE_LEN + 1];
   char w_zip[ZIP_LEN + 1];
   char d_street_1[ADDR_LEN + 1];
   char d_street_2[ADDR_LEN + 1];
   char d_city[ADDR_LEN + 1];
   char d_state[STATE_LEN + 1];
   char d_zip[ZIP_LEN + 1];
   char c_first[NAME_LEN + 1];
   char c_middle[3];
   char c_last[NAME_LEN + 1];
   char c_street_1[ADDR_LEN + 1];
   char c_street_2[ADDR_LEN + 1];
   char c_city[ADDR_LEN + 1];
   char c_state[STATE_LEN + 1];
   char c_zip[ZIP_LEN + 1];
   char c_phone[16];
   DBDATEREC c_since;
   char c_credit[3];
   double c_credit_lim;
   double c_discount;
   double c_balance;
   char c_data[200+1];
   char execution_status[STATUS_LEN];
} PAYMENT_DATA;

typedef struct
{
   long ol_i_id;
   short ol_supply_w_id;
   short ol_quantity;
   double ol_amount;
   DBDATEREC ol_delivery_d;
} OL_ORDER_STATUS_DATA;

typedef struct
{
   short w_id;
   short d_id;
   long c_id;
   char c_first[NAME_LEN + 1];
   char c_middle[3];
   char c_last[NAME_LEN + 1];
   double c_balance;
   long o_id;
   DBDATEREC o_entry_d;
   short o_carrier_id;
   OL_ORDER_STATUS_DATA OlOrderStatusData[MAX_OL];
   short o_ol_cnt;
   char execution_status[STATUS_LEN];
} ORDER_STATUS_DATA;

typedef struct
{
   short w_id;
   short o_carrier_id;
   long o_id[10];
   int iComplete;
   SYSTEMTIME QTime;                // time delivery was queued
   SYSTEMTIME EndTime;              // time delivery completed
   char execution_status[STATUS_LEN];
} DELIVERY_DATA;

typedef struct
{
   short w_id;
   short d_id;
   short thresh_hold;
   long low_stock;
   char execution_status[STATUS_LEN];
} STOCK_LEVEL_DATA;

typedef struct
{
   LPVOID ConnID;                   // Active Connection Id
   SHORT sWId;                      // TPCC WareHouse Id
   SHORT sDId;                      // TPCC District Id
   INT  iSyncId;                    // TPCC Sync Id
   INT  iTermId;                    // TPCC Term Id
   UINT uFormId;                    // TPCC Form Id
   INT  iStatusId;                  // TPCC Status Id
   CHAR ErrTxt[500];                // Error text
   CHAR szWork[200];                // Thread work area
   CHAR szHeader[100];              // HTTP work area
   CHAR * RecvMsg;                  // HTML message from ECB
   CHAR SendMsg[MAX_MSG_SZ];        // HTML work area
   TMON_STATE tsTMon;               // TMon Interface
} TPCC_STATE;
```

tpcc.c

```
// tpcc.c
//
// Copyright Unisys, 1997
//
#include <windows.h>
#include <stdio.h>
#include <malloc.h>
#include <stdlib.h>
#include <string.h>
#include <winreg.h>
#include <httpext.h>
```

```
#include "tmon.h"
#include "diagio.h"
#include "term.h"
#include "tpcchandler.h"

#define EXTN_VERSION MAKELONG(HSE_VERSION_MINOR,HSE_VERSION_MAJOR)
#define TLS_NULL 0xFFFFFFFF
DWORD dwTlsInx;
CHAR * pTitle = "IIS TPCC DLL";
CRITICAL_SECTION csDllMain;

// Diagnostic logging settings
BOOL bEventLog = TRUE;
BOOL bConsole = FALSE;
UINT uDiagLevel = DIAG_INFO;

// TMon Interface Settings
INT iTMMaxMsg = 0;

// Term Interface Settings
INT iMaxTerms = 3000;

static CHAR * szTPCCError =
   HTTPHdr "<HTML>"
   "<HEAD><TITLE>Welcome To TPC-C</TITLE></HEAD><BODY>"
   "<B>TPCC Extension Error (TPCC Array Not Allocated)</B><BR>"
   "</BODY></HTML>";

static CHAR * szTMInitError =
   HTTPHdr "<HTML>"
   "<HEAD><TITLE>Welcome To TPC-C</TITLE></HEAD><BODY>"
   "<B>TPCC Extension Error (TMInit Failed)</B><BR>"
   "</BODY></HTML>";
INT iHHdrLen = 0;
INT iCTextLen = 0;

BOOL ThreadAttach(TPCC_STATE * pTPCC,CHAR * pDiag);
VOID ThreadDetach(TPCC_STATE * pTPCC);
VOID SendResponse(EXTENSION_CONTROL_BLOCK * pECB,CHAR * pMsg,CHAR *
pWork);
BOOL ReadRegistry(VOID);

//====================================================================
//
// Function name: DllMain
//
//====================================================================
BOOL APIENTRY DllMain(HANDLE hInst, ULONG ul_reason_for_call,
                      LPVOID lpReserved)
{
   TPCC_STATE * pTPCC = NULL;
   CHAR szDiag[MAX_DIAG_SZ];
   UINT iTMMaxSz =0;
   switch(ul_reason_for_call)
   {
      case DLL_PROCESS_ATTACH:
         // Process initialization

         InitializeCriticalSection(&csDllMain);
         ReadRegistry();
         DiagIoInit(pTitle,bConsole,bEventLog,uDiagLevel);
         sprintf(szDiag,
            "EventLog = %d, Console = %d, DiagLevel = %d\n"
            "MaxTerms = %d\n",
            bEventLog,bConsole,uDiagLevel,iMaxTerms);
         DiagIoWrite(szDiag,DIAG_FORCE);
         dwTlsInx = TlsAlloc();
         if (dwTlsInx == TLS_NULL)
         {
            sprintf(szDiag,"PAttach(%ld): Tls Alloc Failed (%ld)\n",
               GetCurrentThreadId(),GetLastError);
            DiagIoWrite(szDiag,DIAG_ERROR);
            return(FALSE);
         };
         if (TermInit(iMaxTerms))
            return(FALSE);
         iTMMaxSz = max(iTMMaxSz,sizeof(NEW_ORDER_DATA));
         iTMMaxSz = max(iTMMaxSz,sizeof(PAYMENT_DATA));
         iTMMaxSz = max(iTMMaxSz,sizeof(ORDER_STATUS_DATA));
         iTMMaxSz = max(iTMMaxSz,sizeof(DELIVERY_DATA));
         iTMMaxSz = max(iTMMaxSz,sizeof(STOCK_LEVEL_DATA));
         iTMMaxSz += 10;
         TMonInit(iTMMaxSz);
         iHHdrLen = strlen(HTTPHdr);
         iCTextLen = strlen(CTEXT);
         break;
      case DLL_THREAD_ATTACH:
         // Move ThreadAttach call to HttpExt since the DllMain call
         // for Thread Attach did not reliably come before the first
         // call to HttpExtProc.
         break;
               case DLL_THREAD_DETACH:
         ThreadDetach(pTPCC);
                     break;
               case DLL_PROCESS_DETACH:
         ThreadDetach(pTPCC);
         DeleteCriticalSection(&csDllMain);
         TMonTerm();
         TermTerm();
         TlsFree(dwTlsInx);
         dwTlsInx = TLS_NULL;
         DiagIoTerm();
                     break;
       };
       return TRUE;
};   // DllMain

//====================================================================
//
// Function name: ThreadAttach
//
// Result:
//    FALSE Thread state structure initialized
//    TRUE  Thread state structure initialization failure
//
//====================================================================
BOOL ThreadAttach(TPCC_STATE * pTPCC,CHAR * pDiag)
{
   BOOL bRslt;
   UINT uLabelNoOp;
   EnterCriticalSection(&csDllMain);
```

```
   __try
   {
      pTPCC = (TPCC_STATE *) calloc(1,sizeof(TPCC_STATE));
      if (pTPCC == NULL)
      {
         sprintf(pDiag,"ThrAtt(%ld): pTPCC Alloc Failed (%ld)\n",
            GetCurrentThreadId(),GetLastError);
         DiagIoWrite(pDiag,DIAG_ERROR);
         bRslt = TRUE;
         goto TAttachXit;
      };
      TlsSetValue(dwTlsInx,pTPCC);
      pTPCC->tsTMon.pTMData = NULL;
      pTPCC->tsTMon.pszErrTxt = pTPCC->ErrTxt;
      if (TMInit(&pTPCC->tsTMon))
      {
         sprintf(pDiag,"ThrAtt(%ld): TMInit %s\n",
            GetCurrentThreadId(),pTPCC->ErrTxt);
         DiagIoWrite(pDiag,DIAG_ERROR);
         bRslt = TRUE;
         goto TAttachXit;
      };
      bRslt = FALSE;
TAttachXit:
      uLabelNoOp = 0;
   }
   __finally
   {
      LeaveCriticalSection(&csDllMain);
   };

   return(bRslt);

};   // ThreadAttach

//============================================================================
//
// Function name: ThreadDetach
//
//============================================================================
VOID ThreadDetach(TPCC_STATE * pTPCC)
{
   EnterCriticalSection(&csDllMain);
   __try
   {
      pTPCC = TlsGetValue(dwTlsInx);
      if (pTPCC != NULL)
      {
         TMDone(&pTPCC->tsTMon);
         free(pTPCC);
         pTPCC = NULL;
         TlsSetValue(dwTlsInx,pTPCC);
      };
   }
   __finally
   {
      LeaveCriticalSection(&csDllMain);
   };
};   // ThreadDetach

//============================================================================
//
// Function name: GetExtensionVersion
//
//============================================================================
BOOL WINAPI GetExtensionVersion(HSE_VERSION_INFO *pVersion)
{
   pVersion->dwExtensionVersion = EXTN_VERSION;
   strncpy(pVersion->lpszExtensionDesc,pTitle,HSE_MAX_EXT_DLL_NAME_LEN);
   return TRUE;
};   // GetExtensionVersion

//============================================================================
//
// Function name: HttpExtensionProc
//
//
// Returns:
//    HSE_STATUS_SUCCESS               send msg, drop connection
//    HSE_STATUS_SUCCESS_AND_KEEP_CONN       send msg, keep connection
//
//============================================================================
DWORD WINAPI HttpExtensionProc(EXTENSION_CONTROL_BLOCK * pECB)
{
   TPCC_STATE * pTPCC;
   DWORD dwRslt = HSE_STATUS_SUCCESS;
   UINT uRslt;

   pTPCC = TlsGetValue(dwTlsInx);
   if (pTPCC == NULL)
   {
      CHAR szWork[200];
      ThreadAttach(pTPCC,szWork);
      pTPCC = TlsGetValue(dwTlsInx);
      if (pTPCC == NULL)
      {
         SendResponse(pECB,szTPCCError,szWork);
         goto HttpXit;
      };
   };
   if (pTPCC->tsTMon.pTMData == NULL)
      SendResponse(pECB,szTMInitError,pTPCC->szHeader);
   TPCCClear(pTPCC);
   pTPCC->ConnID = pECB->ConnID;
   pTPCC->RecvMsg = pECB->lpszQueryString;
   uRslt = TPCCHandler(pTPCC);
   switch (uRslt)
   {
      case TPCCSEND:
         SendResponse(pECB,pTPCC->SendMsg,pTPCC->szHeader);
         dwRslt = HSE_STATUS_SUCCESS_AND_KEEP_CONN;
         break;
      case TPCCSENDEND:
         SendResponse(pECB,pTPCC->SendMsg,pTPCC->szHeader);
         break;
      case TPCCENDNOW:
      default:
         break;
   };   // switch (TPCCHandler result)

HttpXit:
```

```
        return(dwRslt);

};   // HttpExtensionProc

//====================================================================
//
// Function name: SendResponse
//
//====================================================================
VOID SendResponse(EXTENSION_CONTROL_BLOCK * pECB,CHAR * pMsg,CHAR * pWork)
{
   DWORD dwMsgBytes;
   CHAR * pCL;
   dwMsgBytes = strlen(pMsg);
   pCL=strstr(pMsg,CTEXT);
   dwMsgBytes -= iHHdrLen;
   sprintf(pWork,"%4ld",dwMsgBytes);
   pCL += iCTextLen;
   strncpy(pCL,pWork,4);
   (*pECB->ServerSupportFunction)
      (pECB->ConnID,
      HSE_REQ_SEND_RESPONSE_HEADER,
      NULL,
      &dwMsgBytes,
      (LPDWORD)pMsg);
};   // SendResponse

//====================================================================
//
// Function name: ReadRegistry
//
//    Sets global operational parameters from registry if they exist.
//    Otherwise, compiled in defaults apply.
//
// Result:
//    FALSE    Registry entry found
//    TRUE     Registry entry does not exist
//
//====================================================================
BOOL ReadRegistry(VOID)
{
   HKEY hkTPCC;
   DWORD       dwMax;
   DWORD       dwRT;
   INT i;
   CHAR szValue[100];
   if (RegOpenKeyEx(HKEY_LOCAL_MACHINE,"SOFTWARE\\Unisys\\TPCC",0,
      KEY_READ, &hkTPCC) != ERROR_SUCCESS )
      return(TRUE);
   dwMax = sizeof(szValue);
   if (RegQueryValueEx(hkTPCC,"EVENTLOG",0,&dwRT,szValue,&dwMax)
      == ERROR_SUCCESS)
   {
      if (abs(atoi(szValue) == 0))
         bEventLog = FALSE;
      else
         bEventLog = TRUE;
   };
   dwMax = sizeof(szValue);
   if (RegQueryValueEx(hkTPCC,"CONSOLE",0,&dwRT,szValue,&dwMax)
      == ERROR_SUCCESS )
   {
      if (abs(atoi(szValue) == 0))
         bConsole = FALSE;
      else
         bConsole = TRUE;
   };
   dwMax = sizeof(szValue);
   if (RegQueryValueEx(hkTPCC,"DIAGLEVEL",0,&dwRT,szValue,&dwMax)
      == ERROR_SUCCESS )
   {
      i = atoi(szValue);
      if (i < DIAG_FORCE)
         i = DIAG_FORCE;
      else
      if (i > DIAG_INFO)
         i = DIAG_INFO;
      uDiagLevel = i;
   };
   dwMax = sizeof(szValue);
   if (RegQueryValueEx(hkTPCC,"MAXTERMS",0,&dwRT,szValue,&dwMax)
      == ERROR_SUCCESS )
   {
      iMaxTerms = abs(atoi(szValue));
   };
   RegCloseKey(hkTPCC);
   return(FALSE);
};   // ReadRegistry
```

tpcchandler.h

```
// tpcchandler.h

#include "tpcc.h"

BOOL TPCCClear(TPCC_STATE * pTPCC);
UINT TPCCHandler(TPCC_STATE * pTPCC);
```

tpcchandler.c

```
// tpcchandler.c
//
// Copyright Unisys, 1997
//
#include <windows.h>
#include <stdio.h>
#include <stdlib.h>
#include <string.h>

#include "tmon.h"
#include "diagio.h"
#include "tpcchandler.h"
#include "term.h"

// pTPCC->iFormId - TPCC forms enumeration.
#define FORM_NULL        0
#define FORM_LOGON       1
#define FORM_MENU        2
#define FORM_NEWORDER    3
```

```
#define FORM_PAYMENT     4
#define FORM_DELIVERY    5
#define FORM_ORDERSTATUS 6
#define FORM_STOCKLEVEL  7
#define FORM_EXIT        8
#define FORM_MAX         9

// CMD= HTML Command Enumeration and Name
#define CMD_NULL               0
#define CMD_PROCESS            1
#define CMD_NEWORDER_FORM      2
#define CMD_PAYMENT_FORM       3
#define CMD_DELIVERY_FORM      4
#define CMD_ORDERSTATUS_FORM   5
#define CMD_STOCKLEVEL_FORM    6
#define CMD_EXIT               7
#define CMD_SUBMIT             8
#define CMD_MENU_FORM          9
#define CMD_MAX                10

static CHAR * szCmds[] =
{
   "Unknown",
   "Process",
   "..NewOrder..",
   "..Payment..",
   "..Delivery..",
   "..Order-Status..",
   "..Stock-Level..",
   "..Exit..",
   "Submit",
   "Menu"
};

static CHAR * szFormLogin =
   HTTPHdr "<HTML>"
   "<HEAD><TITLE>Welcome To TPC-C</TITLE></HEAD><BODY>"
   "Please Identify your Warehouse and District for this session.<BR>"
   "<FORM ACTION=\"tpcc.dll\" METHOD=\"GET\">"
   "<INPUT TYPE=\"hidden\" NAME=\"STATUSID\" VALUE=\"0\">"
   "<INPUT TYPE=\"hidden\" NAME=\"FORMID\" VALUE=\"1\">"
   "<INPUT TYPE=\"hidden\" NAME=\"TERMID\" VALUE=\"-2\">"
   "<INPUT TYPE=\"hidden\" NAME=\"SYNCID\" VALUE=\"0\">"
   "Warehouse ID <INPUT NAME=\"w_id\" SIZE=4><BR>"
   "District ID <INPUT NAME=\"d_id\" SIZE=2><BR>"
   "<HR>"
   "<INPUT TYPE=\"submit\" NAME=\"CMD\" VALUE=\"Submit\">"
   "</FORM>";

static CHAR * szMenuList =
   "<INPUT TYPE=\"submit\" NAME=\"CMD\" VALUE=\"..NewOrder..\">"
   "<INPUT TYPE=\"submit\" NAME=\"CMD\"VALUE=\"..Payment..\">"
   "<INPUT TYPE=\"submit\" NAME=\"CMD\"VALUE=\"..Delivery..\">"
   "<INPUT TYPE=\"submit\" NAME=\"CMD\"VALUE=\"..Order-Status..\">"
   "<INPUT TYPE=\"submit\" NAME=\"CMD\"VALUE=\"..Stock-Level..\">"
   "<INPUT TYPE=\"submit\" NAME=\"CMD\"VALUE=\"..Exit..\">";

static CHAR * HTMLTrailer =
   "</BODY></HTML>";

static CHAR * TERMIDTOKEN = "TERMID=";
static CHAR * SYNCIDTOKEN = "SYNCID=";
static CHAR * FORMIDTOKEN = "FORMID=";
static CHAR * STATUSIDTOKEN = "STATUSID=";
static CHAR * CMDTOKEN = "CMD=";
static CHAR * NEWORDER_SERVICE = "NEWORDER";
static CHAR * PAYMENT_SERVICE = "PAYMENT";
static CHAR * ORDERSTATUS_SERVICE = "ORDERSTS";
static CHAR * DELIVERY_SERVICE = "DELIVERY";
static CHAR * STOCKLEVEL_SERVICE = "STOCKLVL";
static CHAR * ZIPPIC = "XXXXX-XXXX";

BOOL ProcessLogin(CHAR * pIn,CHAR * pOut,TPCC_STATE * pTPCC);
BOOL ProcessForm(CHAR * pIn,CHAR * pOut,TPCC_STATE * pTPCC);
BOOL ProcessNewOrder(CHAR * pIn,CHAR * pOut,TPCC_STATE * pTPCC);
BOOL ProcessPayment(CHAR * pIn,CHAR * pOut,TPCC_STATE * pTPCC);
BOOL ProcessDelivery(CHAR * pIn,CHAR * pOut,TPCC_STATE * pTPCC);
BOOL ProcessOrderStatus(CHAR * pIn,CHAR * pOut,TPCC_STATE * pTPCC);
BOOL ProcessStockLevel(CHAR * pIn,CHAR * pOut,TPCC_STATE * pTPCC);
VOID FormatLogin(CHAR * pMsg,CHAR * pAddText);
BOOL GetHidden(CHAR * pMsg,UINT * uFormId,INT * iSyncId,INT * iTermId);
BOOL GetCmd(CHAR * pMsg,CHAR * pWork,UINT uLen);
BOOL GetLongKey(LONG * lRslt,CHAR * pHTML,CHAR * pKey,TPCC_STATE * pTPCC);
BOOL GetIntKey(INT * iRslt,CHAR * pHTML,CHAR * pKey,TPCC_STATE * pTPCC);
BOOL GetShortKey(SHORT * sRslt,CHAR * pHTML,CHAR * pKey,TPCC_STATE *
pTPCC);
BOOL GetStringKey(CHAR * szRslt,CHAR * pHTML,CHAR * pKey,
                  TPCC_STATE * pTPCC,UINT uMax);
BOOL GetAmountKey(DOUBLE * dRslt,CHAR * pHTML,CHAR * pKey,
                  TPCC_STATE * pTPCC);
BOOL GetKeyValue(CHAR * pHTML,CHAR * pKey,CHAR * pValue,UINT uMax);
VOID FormatLogin(CHAR * pOut,CHAR * pAddText);
VOID FormatMenu(CHAR * pOut,TPCC_STATE * pTPCC);
VOID FormatNewOrder(CHAR * pOut,TPCC_STATE * pTPCC);
VOID FormatPayment(CHAR * pOut,TPCC_STATE * pTPCC);
VOID FormatDelivery(CHAR * pOut,TPCC_STATE * pTPCC);
VOID FormatOrderStatus(CHAR * pOut,TPCC_STATE * pTPCC);
VOID FormatStockLevel(CHAR * pOut,TPCC_STATE * pTPCC);
VOID FormatFormHdr(CHAR * pOut,CHAR * pTitle,TPCC_STATE * pTPCC);
VOID FormatRespHdr(CHAR * pOut,CHAR * pTitle,TPCC_STATE * pTPCC);
VOID FormatHTMLString(CHAR * pOut,CHAR * pIn,UINT uLen);
VOID FormatString(CHAR * pOut,CHAR * pPic,CHAR * pIn);
VOID UtilStrCpy(CHAR * pDest,CHAR * pSrc,INT n);
BOOL CheckNumeric(CHAR * pNum);

//============================================================================
//
// Function name: TPCCClear
//
//============================================================================
BOOL TPCCClear(TPCC_STATE * pTPCC)
{
   pTPCC->ConnID = 0;
   pTPCC->sWId = 0;
   pTPCC->sDId = 0;
   pTPCC->iSyncId = 0;
   pTPCC->iTermId = -2;
   pTPCC->uFormId = FORM_NULL;
   pTPCC->iStatusId = 0;
   pTPCC->tsTMon.lTMDataLen = 0;
   strcpy(pTPCC->ErrTxt,"");
   return(FALSE);
```

```
};   // TPCCClear

//============================================================================
//
// Function name: TPCCHandler
//
//============================================================================
UINT TPCCHandler(TPCC_STATE * pTPCC)
{
   INT iSyncId;
   INT iTermId;
   UINT uCmdId;
   UINT uRslt = TPCCSENDEND;  // default error handling
   TERM_STATE * pTerm;

   pTPCC->iStatusId = STATUS_OK;
   if (GetHidden(pTPCC->RecvMsg,&pTPCC->uFormId,&iSyncId,&iTermId))
   {
      uRslt = TPCCSEND;
      FormatLogin(pTPCC->SendMsg,pTPCC->ErrTxt);
      goto HdlrXit;
   };
   if (iTermId > 0)
   {
      pTerm = TermGet(iTermId);
      if (pTerm == NULL)
      {
         uRslt = TPCCSEND;
         strcpy(pTPCC->ErrTxt,"Invalid Term Id");
         FormatLogin(pTPCC->SendMsg,pTPCC->ErrTxt);
         goto HdlrXit;
      };
      if (pTerm->ConnID != pTPCC->ConnID)
      {
         uRslt = TPCCSEND;
         strcpy(pTPCC->ErrTxt,"TermId vs ConnId Mismatch");
         FormatLogin(pTPCC->SendMsg,pTPCC->ErrTxt);
         goto HdlrXit;
      };
      pTPCC->sWId = pTerm->sWId;
      pTPCC->sDId = pTerm->sDId;
      pTPCC->iSyncId = pTerm->iSyncId;
      pTPCC->iTermId = pTerm->iTermId;
   };
   uCmdId = GetCmd(pTPCC->RecvMsg,pTPCC->szWork,sizeof(pTPCC->szWork));
   // Except for Submit(log in), sWId must already be set
   if (pTPCC->sWId == 0 && uCmdId != CMD_SUBMIT)
   {
      strcpy(pTPCC->ErrTxt,"Must log in first!");
      FormatLogin(pTPCC->SendMsg,pTPCC->ErrTxt);
      uRslt = TPCCSEND;
      goto HdlrXit;
   };
   // Check for multiple log in attempts
   if (pTPCC->sWId != 0 && uCmdId == CMD_SUBMIT)
   {
      strcpy(pTPCC->ErrTxt,ERRTXT_ALREADY_LOGGEDIN);
      pTPCC->iStatusId = ERR_ALREADY_LOGGEDIN;
      FormatMenu(pTPCC->SendMsg,pTPCC);
      uRslt = TPCCSEND;
      goto HdlrXit;
   };
   // If not logging in, validate hidden fields
   if (uCmdId != CMD_SUBMIT)
   {
      if (iTermId != pTPCC->iTermId || iTermId != iSyncId)
      {
         sprintf(pTPCC->ErrTxt,"%s: Received %ld, %ld (%ld)",
            ERRTXT_TERMID,iTermId,iSyncId,pTPCC->iTermId);
         pTPCC->iStatusId = ERR_TERMID;
         FormatMenu(pTPCC->SendMsg,pTPCC);
         goto HdlrXit;
      };
   };
   // Process the command
   switch (uCmdId)
   {
      case CMD_SUBMIT:
         ProcessLogin(pTPCC->RecvMsg,pTPCC->SendMsg,pTPCC);
         break;
      case CMD_MENU_FORM:
         FormatMenu(pTPCC->SendMsg,pTPCC);
         break;
      case CMD_PROCESS:
         ProcessForm(pTPCC->RecvMsg,pTPCC->SendMsg,pTPCC);
         break;
      case CMD_NEWORDER_FORM:
         FormatNewOrder(pTPCC->SendMsg,pTPCC);
         break;
      case CMD_PAYMENT_FORM:
         FormatPayment(pTPCC->SendMsg,pTPCC);
         break;
      case CMD_DELIVERY_FORM:
         FormatDelivery(pTPCC->SendMsg,pTPCC);
         break;
      case CMD_ORDERSTATUS_FORM:
         FormatOrderStatus(pTPCC->SendMsg,pTPCC);
         break;
      case CMD_STOCKLEVEL_FORM:
         FormatStockLevel(pTPCC->SendMsg,pTPCC);
         break;
      case CMD_EXIT:
         TermFree(pTPCC->iTermId);
         strcpy(pTPCC->ErrTxt,"Logged Off");
         FormatLogin(pTPCC->SendMsg,pTPCC->ErrTxt);
         goto HdlrXit;
      default:
         strcpy(pTPCC->ErrTxt,ERRTXT_CMD_UNKNOWN);
         pTPCC->iStatusId = ERR_CMD_UNKNOWN;
         if (pTPCC->sWId == 0)
            FormatLogin(pTPCC->SendMsg,pTPCC->ErrTxt);
         else
            FormatMenu(pTPCC->SendMsg,pTPCC);
         break;
   };   // switch (uCmdId)

   uRslt = TPCCSEND;

HdlrXit:

   return(uRslt);
```

```
};   // TPCCHandler

//============================================================================
//
// Function name: ProcessLogin
//
//    ProcessLogin extracts WId and DId from the incoming form.  Assumes
//    log in has not previously completed (sWId == 0 already verified).
//
//    Result:
//       FALSE - log in successful, sWId and sDId set in pTPCC,
//               pOut contains menu.
//       TRUE - log in failed, pOut contains log in form with
//              error message.
//
//============================================================================
BOOL ProcessLogin(CHAR * pIn,CHAR * pOut,TPCC_STATE * pTPCC)
{
   SHORT sWId;
   SHORT sDId;
   TERM_STATE * pTerm;

   if (GetShortKey(&sWId,pIn,"w_id",pTPCC))
   {
     FormatLogin(pOut,pTPCC->ErrTxt);
     return(TRUE);
   };
   if (sWId < 1)
   {
      sprintf(pTPCC->ErrTxt,"Warehouse Id (%d) Invalid",sWId);
      pTPCC->iStatusId = ERR_WID_INVALID;
      FormatLogin(pOut,pTPCC->ErrTxt);
      return(TRUE);
   };
   if (GetShortKey(&sDId,pIn,"d_id",pTPCC))
   {
     FormatLogin(pOut,pTPCC->ErrTxt);
     return(TRUE);
   };
   if (sDId < MIN_DId || sDId > MAX_DId)
   {
      sprintf(pTPCC->ErrTxt,"DId Out of Range(%ld,%ld) - %ld",
         MIN_DId,MAX_DId,sDId);
      pTPCC->iStatusId = ERR_DID_INVALID;
      FormatLogin(pOut,pTPCC->ErrTxt);
      return(TRUE);
   };
   pTerm = TermAlloc();
   if (pTerm == NULL)
   {
      sprintf(pTPCC->ErrTxt,"Unable to Allocate Terminal Entry");
      pTPCC->iStatusId = ERR_TERM_ALLOC;
      FormatLogin(pOut,pTPCC->ErrTxt);
      return(TRUE);
   };
   pTerm->ConnID = pTPCC->ConnID;
   pTerm->iSyncId = pTerm->iTermId;
   pTerm->sWId = abs(sWId);
   pTerm->sDId = abs(sDId);
   pTPCC->iTermId = pTerm->iTermId;
   pTPCC->iSyncId = pTerm->iSyncId;
   pTPCC->sWId = pTerm->sWId;
   pTPCC->sDId = pTerm->sDId;
   FormatMenu(pOut,pTPCC);
   return(FALSE);
};   // ProcessLogin

//============================================================================
//
// Function name: ProcessForm
//
//    ProcessForm uses pTPCC->uFormId to determine which form input is
//    present and ready for processing.  Actual processing is done by
//    the form specific routine.
//
//    Result:
//       FALSE - form processed, pOut contains response.
//       TRUE - error processing form input, pOut contains reason.
//
//============================================================================
BOOL ProcessForm(CHAR * pIn,CHAR * pOut,TPCC_STATE * pTPCC)
{
   switch (pTPCC->uFormId )
   {
      case FORM_NEWORDER:
               return(ProcessNewOrder(pIn,pOut,pTPCC));
      case FORM_PAYMENT:
               return(ProcessPayment(pIn,pOut,pTPCC));
      case FORM_DELIVERY:
               return(ProcessDelivery(pIn,pOut,pTPCC));
      case FORM_ORDERSTATUS:
               return(ProcessOrderStatus(pIn,pOut,pTPCC));
      case FORM_STOCKLEVEL:
               return(ProcessStockLevel(pIn,pOut,pTPCC));
      default:
         sprintf(pTPCC->ErrTxt,"%s (%ld)",
            ERRTXT_FORM_UNKNOWN,pTPCC->uFormId);
         pTPCC->iStatusId = ERR_FORM_UNKNOWN;
         FormatMenu(pOut,pTPCC);
         break;
      }
   return(TRUE);
};   // ProcessForm

//============================================================================
//
// Function name: ProcessNewOrder
//
//    ProcessNewOrder extracts the input data fields from pIn, processes
//    the data, and returns a response in pOut.
//
//    Result:
//       FALSE - NewOrder processed successfully.
//       TRUE - NewOrder processing failed.
//
//============================================================================
BOOL ProcessNewOrder(CHAR * pIn,CHAR * pOut,TPCC_STATE * pTPCC)
{
   NEW_ORDER_DATA * pnod;
   TMON_STATE * pTMon;
   CHAR szKey[20];
   CHAR szCredit[14];
```

```
CHAR * ptr;
UINT u;
BOOL bDone = FALSE;
BOOL bTMRslt;
BOOL bTPRslt;
INT iTPRslt;

pTMon = &pTPCC->tsTMon;
pTMon->lTMDataLen = sizeof(NEW_ORDER_DATA);
memset(pTMon->pTMData,0,pTMon->lTMDataLen);
pnod = (NEW_ORDER_DATA *) pTMon->pTMData;
pnod->w_id = pTPCC->sWId;
if (GetShortKey(&pnod->d_id,pIn,"DID*",pTPCC))
{
  FormatMenu(pOut,pTPCC);
  return(TRUE);
};
if (pnod->d_id < MIN_DId || pnod->d_id > MAX_DId)
{
   sprintf(pTPCC->ErrTxt,"DId Out of Range(%ld,%ld) - %ld",
      MIN_DId,MAX_DId,pnod->d_id);
   pTPCC->iStatusId = ERR_DID_INVALID;
   FormatMenu(pOut,pTPCC);
   return(TRUE);
};
if (GetLongKey(&pnod->c_id,pIn,"CID*",pTPCC))
{
  FormatMenu(pOut,pTPCC);
  return(TRUE);
};
pnod->o_ol_cnt = 0;
ptr = pIn;
for(u=0; u < MAX_OL; u++)
{
   sprintf(szKey,"SP%2.2d*",u);
   ptr = strstr(ptr,szKey);
   if (GetShortKey(&pnod->Ol[u].ol_supply_w_id,ptr,szKey,pTPCC))
   {
      FormatMenu(pOut,pTPCC);
      return(TRUE);
   };
   sprintf(szKey,"IID%2.2d*",u);
   if (GetLongKey(&pnod->Ol[u].ol_i_id,ptr,szKey,pTPCC))
   {
      FormatMenu(pOut,pTPCC);
      return(TRUE);
   };
   sprintf(szKey,"Qty%2.2d*",u);
   if (GetShortKey(&pnod->Ol[u].ol_quantity,ptr,szKey,pTPCC))
   {
      FormatMenu(pOut,pTPCC);
      return(TRUE);
   };
   if (pnod->Ol[u].ol_i_id != 0)
   {
      // Check for prior blank lines
      if (bDone)
      {
         strcat(pTPCC->ErrTxt,"Embedded Empty Order Lines");
         pTPCC->iStatusId = ERR_EMBEDDED_EMPTY_OL;
         FormatMenu(pOut,pTPCC);
         return(TRUE);
      };
      if (pnod->Ol[u].ol_supply_w_id < 1)
      {
         sprintf(pTPCC->ErrTxt,
            "Order Line %ld Contains Invalid WId %d",
            u,pnod->Ol[u].ol_supply_w_id);
         pTPCC->iStatusId = ERR_WID_INVALID;
         FormatMenu(pOut,pTPCC);
         return(TRUE);
      };
      if (pnod->Ol[u].ol_quantity < MIN_QUANTITY ||
          pnod->Ol[u].ol_quantity > MAX_QUANTITY)
      {
         sprintf(pTPCC->ErrTxt,
            "Order Line %ld Contains Invalid Qty %d",
            u,pnod->Ol[u].ol_quantity);
         pTPCC->iStatusId = ERR_QUANTITY_INVALID;
         FormatMenu(pOut,pTPCC);
         return(TRUE);
      };
      pnod->o_ol_cnt++;
   }   // if (ol_i_id !=0)
   else
   {
      if (pnod->Ol[u].ol_supply_w_id != 0)
      {
         sprintf(pTPCC->ErrTxt,
            "Order Line %ld WId Supplied with No Item",u);
         pTPCC->iStatusId = ERR_OL_INVALID;
         FormatMenu(pOut,pTPCC);
         return(TRUE);
      };
      if (pnod->Ol[u].ol_quantity != 0)
      {
         sprintf(pTPCC->ErrTxt,
            "Order Line %ld Qty Supplied with No Item",u);
         pTPCC->iStatusId = ERR_OL_INVALID;
         FormatMenu(pOut,pTPCC);
         return(TRUE);
      };
      bDone = TRUE;
   };   // empty order line
};   // for (u < MAX_OL)

if (pnod->o_ol_cnt < MIN_OL)
{
   sprintf(pTPCC->ErrTxt,"Too Few Order Lines %d",pnod->o_ol_cnt);
   pTPCC->iStatusId = ERR_OL_COUNT;
   FormatMenu(pOut,pTPCC);
   return(TRUE);
};
bTMRslt = TMTran(NEWORDER_SERVICE,pTMon,&bTPRslt,&iTPRslt);
pnod = (NEW_ORDER_DATA *) pTMon->pTMData;
if (bTMRslt)
{
   pTPCC->iStatusId = ERR_TM_INTERFACE;
   FormatMenu(pOut,pTPCC);
   return(TRUE);
};
// Exclude invalid item id case
```

```
   if (bTPRslt && iTPRslt < SVC_NOERROR)
   {
      sprintf(pTPCC->ErrTxt,
         "New Order Service Returned Error(%ld): %s",
         iTPRslt,pnod->execution_status);
      pTPCC->iStatusId = ERR_SERVICE_RSLT;
      FormatMenu(pOut,pTPCC);
      return(TRUE);
   };
   if (iTPRslt == SVC_BADITEMID)
      pTPCC->iStatusId = INVALID_IID;

   FormatRespHdr(pOut,"TPC-C New Order",pTPCC);
   sprintf(pOut + strlen(pOut),
      "<PRE>                                  New Order<BR>"
      "Warehouse: %4.4d   District: %2.2d                          ",
      pnod->w_id,pnod->d_id);
   if (!bTPRslt)
     {
      sprintf(pOut + strlen(pOut),
         "Date: %2.2d-%2.2d-%4.4d %2.2d:%2.2d:%2.2d <BR>",
         pnod->o_entry_d.day,pnod->o_entry_d.month,
         pnod->o_entry_d.year,pnod->o_entry_d.hour,
         pnod->o_entry_d.minute,pnod->o_entry_d.second);
   }
   else
   {
      sprintf(pOut + strlen(pOut),"Date:<BR>");
   };
   FormatHTMLString(pTPCC->szWork,pnod->c_last,NAME_LEN);
   FormatHTMLString(szCredit,pnod->c_credit,2);
   sprintf(pOut + strlen(pOut),
      "Customer:  %4.4d   Name: %s   Credit: %s   ",
      pnod->c_id,pTPCC->szWork,szCredit);
   if (!bTPRslt)
   {
      sprintf(pOut + strlen(pOut),
         "%%Disc: %5.2f            <BR>",pnod->c_discount * 100);
      sprintf(pOut + strlen(pOut),
         "Order Number: %8.8d  Number of Lines: %2.2d        W_tax: %5.2f
D_tax: %5.2f  <BR><BR>",
         pnod->o_id,pnod->o_ol_cnt,pnod->w_tax * 100,pnod->d_tax * 100);
      strcat(pOut," Supp_W  Item_Id  Item Name                  Qty  Stock
B/G  Price    Amount<BR>");
      for (u = 0; u < (UINT) pnod->o_ol_cnt; u++)
      {
         FormatHTMLString(pTPCC->szWork,pnod->Ol[u].ol_i_name,24);
         sprintf(pOut + strlen(pOut),
            "  %4.4d   %6.6d   %s  %2.2d    %3.3d    %1.1s   $%6.2f
$%7.2f  <BR>",
            pnod->Ol[u].ol_supply_w_id,pnod->Ol[u].ol_i_id,
            pTPCC->szWork,pnod->Ol[u].ol_quantity,pnod->Ol[u].ol_stock,
            pnod->Ol[u].ol_brand_generic,pnod->Ol[u].ol_i_price,
            pnod->Ol[u].ol_amount );
      }
   }   // if (!bTPRslt)
   else
   {
      strcat(pOut,"%Disc:<BR>");
      sprintf(pOut + strlen(pOut),
         "Order Number: %8.8d  Number of Lines:              W_tax:
D_tax:<BR><BR>",
         pnod->o_id);
      strcat(pOut,
         " Supp_W  Item_Id  Item Name                  Qty  Stock  B/G
Price    Amount<BR>");
      u = 0;
   };
   for(; u < MAX_OL; u++)
      strcat(pOut,"<BR>");
   if (!bTPRslt)
   {
      sprintf(pOut + strlen(pOut),
         "Execution Status: %24.24s                   Total:  $%8.2f  ",
         pnod->execution_status,pnod->total_amount);
   }
   else
   {
      sprintf(pOut + strlen(pOut),
         "Execution Status: %24.24s                   Total:",
         pnod->execution_status);
   };
   sprintf(pOut + strlen(pOut),
      "</PRE><HR><BR>%s</FORM>%s",szMenuList,HTMLTrailer);

   return(FALSE);

};   // ProcessNewOrder

//================================================================================
//
// Function name: ProcessPayment
//
//    ProcessPayment extracts the input data fields from pIn, processes
//    the data, and returns a response in pOut.
//
//    Result:
//       FALSE - Payment processed successfully.
//       TRUE - Payment processing failed.
//
//================================================================================
BOOL ProcessPayment(CHAR * pIn,CHAR * pOut,TPCC_STATE * pTPCC)
{
   PAYMENT_DATA * ppd;
   TMON_STATE * pTMon;
   BOOL bTMRslt;
   BOOL bTPRslt;
   INT iTPRslt;
   CHAR * pCredit;
   INT iCDLines;
   CHAR szWork2[60];
   CHAR szWork3[60];
   CHAR szWork4[60];
   CHAR szZip1[20];
   CHAR szZip2[20];
   INT i;

   pTMon = &pTPCC->tsTMon;
   pTMon->lTMDataLen = sizeof(PAYMENT_DATA);
   memset(pTMon->pTMData,0,pTMon->lTMDataLen);
   ppd = (PAYMENT_DATA *) pTMon->pTMData;
```

```
ppd->w_id = pTPCC->sWId;
// Get and validate DId
if (GetShortKey(&ppd->d_id,pIn,"DID*",pTPCC))
{
  FormatMenu(pOut,pTPCC);
  return(TRUE);
};
if (ppd->d_id < MIN_DId || ppd->d_id > MAX_DId)
{
   sprintf(pTPCC->ErrTxt,"DId Out of Range(%ld,%ld) - %ld",
      MIN_DId,MAX_DId,ppd->d_id);
   pTPCC->iStatusId = ERR_DID_INVALID;
   FormatMenu(pOut,pTPCC);
   return(TRUE);
};
// Get and validate customer Id and name
if (GetLongKey(&ppd->c_id,pIn,"CID*",pTPCC))
{
  FormatMenu(pOut,pTPCC);
  return(TRUE);
};
if (GetStringKey(ppd->c_last,pIn,"CLT*",pTPCC,NAME_LEN))
{
  FormatMenu(pOut,pTPCC);
  return(TRUE);
};
if (ppd->c_id == 0 && ppd->c_last[0] == 0)
{
   strcpy(pTPCC->ErrTxt,"Error - Customer Id and Name Empty");
   pTPCC->iStatusId = ERR_IDANDNAME_EMPTY;
   FormatMenu(pOut,pTPCC);
   return(TRUE);
};
if (ppd->c_id != 0 && ppd->c_last[0] != 0)
{
   strcpy(pTPCC->ErrTxt,
      "Error - Specify Customer Id or Name, not Both");
   pTPCC->iStatusId = ERR_IDANDNAME_ENTERED;
   FormatMenu(pOut,pTPCC);
   return(TRUE);
};
// Get and validate customer DId
if (GetShortKey(&ppd->c_d_id,pIn,"CDI*",pTPCC))
{
  FormatMenu(pOut,pTPCC);
  return(TRUE);
};
if (ppd->c_d_id < MIN_DId || ppd->c_d_id > MAX_DId)
{
   sprintf(pTPCC->ErrTxt,"Cust DId Out of Range(%ld,%ld) - %ld",
      MIN_DId,MAX_DId,ppd->d_id);
   pTPCC->iStatusId = ERR_DID_INVALID;
   FormatMenu(pOut,pTPCC);
   return(TRUE);
};
// Get and validate customer WId
if (GetShortKey(&ppd->c_w_id,pIn,"CWI*",pTPCC))
{
  FormatMenu(pOut,pTPCC);
  return(TRUE);
};
if (ppd->c_w_id < 1)
{
   sprintf(pTPCC->ErrTxt,
      "Payment Contains Invalid Customer WId %d",
      ppd->c_w_id);
   pTPCC->iStatusId = ERR_WID_INVALID;
   FormatMenu(pOut,pTPCC);
   return(TRUE);
};
// Get and validate amount
if (GetAmountKey(&ppd->h_amount,pIn,"HAM*",pTPCC))
{
  FormatMenu(pOut,pTPCC);
  return(TRUE);
};
if (ppd->h_amount <= 0)
{
   sprintf(pTPCC->ErrTxt,
      "Payment Amount Negative or Missing");
   pTPCC->iStatusId = ERR_AMOUNT_INVALID;
   FormatMenu(pOut,pTPCC);
   return(TRUE);
};
bTMRslt = TMTran(PAYMENT_SERVICE,pTMon,&bTPRslt,&iTPRslt);
ppd = (PAYMENT_DATA *) pTMon->pTMData;
if (bTMRslt)
{
   pTPCC->iStatusId = ERR_TM_INTERFACE;
   FormatMenu(pOut,pTPCC);
   return(TRUE);
};
if (bTPRslt)
{
   sprintf(pTPCC->ErrTxt,
      "Payment Service Returned Error(%ld): %s",
      iTPRslt,ppd->execution_status);
   pTPCC->iStatusId = ERR_SERVICE_RSLT;
   FormatMenu(pOut,pTPCC);
   return(TRUE);
};
FormatRespHdr(pOut,"TPC-C Payment",pTPCC);
sprintf(pOut + strlen(pOut),
       "<PRE>                                   Payment<BR>"
   "Date: %2.2d-%2.2d-%4.4d %2.2d:%2.2d:%2.2d <BR><BR>"
   "Warehouse: %4.4d"
   "                         District: %2.2d<BR>",
        ppd->h_date.day,ppd->h_date.month,
   ppd->h_date.year,ppd->h_date.hour,
   ppd->h_date.minute,ppd->h_date.second,
   ppd->w_id,ppd->d_id);

FormatHTMLString(szWork2,ppd->w_street_1,ADDR_LEN);
FormatHTMLString(szWork3,ppd->d_street_1,ADDR_LEN);
sprintf(pOut + strlen(pOut),
   "%s                      %s<BR>",szWork2,szWork3);
FormatHTMLString(szWork2,ppd->w_street_2,ADDR_LEN);
FormatHTMLString(szWork3,ppd->d_street_2,ADDR_LEN);
sprintf(pOut + strlen(pOut),
   "%s                      %s<BR>",szWork2,szWork3);
FormatHTMLString(pTPCC->szWork,ppd->w_city,ADDR_LEN);
FormatHTMLString(szWork2,ppd->d_city,ADDR_LEN);
```

```
   FormatHTMLString(szWork3,ppd->w_state,STATE_LEN);
   FormatHTMLString(szWork4,ppd->d_state,STATE_LEN);
   FormatString(szZip1,ZIPPIC,ppd->w_zip);
   FormatString(szZip2,ZIPPIC,ppd->d_zip);
   sprintf(pOut +  strlen(pOut),
      "%s %s %10.10s       %s %s %10.10s<BR><BR>",
      pTPCC->szWork,szWork3,szZip1,szWork2,szWork4,szZip2);
   FormatHTMLString(szWork2,ppd->c_first,NAME_LEN);
   FormatHTMLString(szWork3,ppd->c_middle,2);
   FormatHTMLString(szWork4,ppd->c_last,NAME_LEN);
   sprintf(pOut + strlen(pOut),
      "Customer: %4.4d  Cust-Warehouse: %4.4d  Cust-District: %2.2d<BR>"
      "Name:   %s %s %s     Since:  %2.2d-%2.2d-%4.4d<BR>",
      ppd->c_id,ppd->c_w_id,ppd->c_d_id,
      szWork2,szWork3,szWork4,
      ppd->c_since.day,ppd->c_since.month,ppd->c_since.year);
   FormatHTMLString(pTPCC->szWork,ppd->c_street_1,ADDR_LEN);
   FormatHTMLString(szWork2,ppd->c_credit,2);
   FormatHTMLString(szWork3,ppd->d_street_2,ADDR_LEN);
   sprintf(pOut + strlen(pOut),
      "        %s                     Credit: %s<BR>"
      "        %s                     %%Disc:  %5.2f<BR>",
      pTPCC->szWork,szWork2,szWork3,ppd->c_discount * 100);
   FormatHTMLString(szWork2,ppd->c_city,ADDR_LEN);
   FormatHTMLString(szWork3,ppd->c_state,STATE_LEN);
   FormatString(szZip1,ZIPPIC,ppd->c_zip);
   FormatString(szWork4,"XXXXXX-XXX-XXX-XXXX",ppd->c_phone);
   sprintf(pOut + strlen(pOut),
      "        %s %s %10.10s       Phone:  %-19.19s<BR><BR>"
      "Amount Paid:          $%7.2f      New Cust Balance: $%14.2f<BR>"
      "Credit Limit:   $%13.2f<BR><BR>",
      szWork2,szWork3,szZip1,szWork4,
      ppd->h_amount,ppd->c_balance,ppd->c_credit_lim);
   pCredit = ppd->c_credit;
   if (*pCredit == 'B' && *(pCredit + 1) == 'C')
   {
      pCredit = ppd->c_data;
      iCDLines = strlen(pCredit) / 50;
      for(i = 0; i < 4; i++, pCredit += 50)
      {
         if (i <= iCDLines)
            UtilStrCpy(szWork2,pCredit,50);
         else
            szWork2[0] = 0;
         FormatHTMLString(szWork3,szWork2,50);
         if (!i)
            sprintf(pOut + strlen(pOut),
               "Cust-Data: %s<BR>",szWork3);
         else
            sprintf(pOut + strlen(pOut),
               "           %s<BR>",szWork3);
      };
   }
   else
      strcat(pOut,"Cust-Data: <BR><BR><BR><BR>");
   sprintf(pOut + strlen(pOut),
      "</PRE><HR><BR>%s</FORM>%s",szMenuList,HTMLTrailer);

   return(FALSE);

};   // ProcessPayment
```

```
//=============================================================================
//
// Function name: ProcessDelivery
//
//    ProcessDelivery extracts the input data fields from pIn, processes
//    the data, and returns a response in pOut.
//
//    Result:
//       FALSE - Delivery processed successfully.
//       TRUE - Delivery processing failed.
//
//=============================================================================
BOOL ProcessDelivery(CHAR * pIn,CHAR * pOut,TPCC_STATE * pTPCC)
{
   DELIVERY_DATA * pdd;
   TMON_STATE * pTMon;
   BOOL bTMRslt;

   pTMon = &pTPCC->tsTMon;
   pTMon->lTMDataLen = sizeof(DELIVERY_DATA);
   memset(pTMon->pTMData,0,pTMon->lTMDataLen);
   pdd = (DELIVERY_DATA *) pTMon->pTMData;
   pdd->w_id = pTPCC->sWId;
   // Get and validate carrier id
   if (GetShortKey(&pdd->o_carrier_id,pIn,"OCD*",pTPCC))
   {
     FormatMenu(pOut,pTPCC);
     return(TRUE);
   };
   if (pdd->o_carrier_id < MIN_CARRIER ||
       pdd->o_carrier_id > MAX_CARRIER)
   {
      sprintf(pTPCC->ErrTxt,"Carrier Id Out of Range(%ld,%ld) - %ld",
         MIN_CARRIER,MAX_CARRIER,pdd->o_carrier_id);
      pTPCC->iStatusId = ERR_CARRIER_INVALID;
      FormatMenu(pOut,pTPCC);
      return(TRUE);
   };
   GetLocalTime(&pdd->QTime);
   bTMRslt = TMPost(DELIVERY_SERVICE,pTMon);
   if (bTMRslt)
   {
      pTPCC->iStatusId = ERR_TM_INTERFACE;
      FormatMenu(pOut,pTPCC);
      return(TRUE);
   };
   strcpy(pdd->execution_status,"Delivery has been queued.");
   FormatRespHdr(pOut,"TPC-C Delivery",pTPCC);
   sprintf(pOut + strlen(pOut),
      "<PRE>                                  Delivery<BR>"
      "Warehouse: %4.4d<BR><BR>"
      "Carrier Number: %2.2d<BR><BR>"
      "Execution Status: %25.25s<BR>",
      pdd->w_id,pdd->o_carrier_id,pdd->execution_status);
   sprintf(pOut + strlen(pOut),
      "</PRE><HR><BR>%s</FORM>%s",szMenuList,HTMLTrailer);

   return(FALSE);

};   // ProcessDelivery
```

```
//=========================================================================
//
// Function name: ProcessOrderStatus
//
//    ProcessOrderStatus extracts the input data fields from pIn,
//    processes the data, and returns a response in pOut.
//
//    Result:
//       FALSE - OrderStatus processed successfully.
//       TRUE - OrderStatus processing failed.
//
//=========================================================================
BOOL ProcessOrderStatus(CHAR * pIn,CHAR * pOut,TPCC_STATE * pTPCC)
{
   ORDER_STATUS_DATA * posd;
   TMON_STATE * pTMon;
   INT i;
   CHAR szWork2[50];
   CHAR szWork3[50];
   BOOL bTMRslt;
   BOOL bTPRslt;
   INT iTPRslt;

   pTMon = &pTPCC->tsTMon;
   pTMon->lTMDataLen = sizeof(ORDER_STATUS_DATA);
   memset(pTMon->pTMData,0,pTMon->lTMDataLen);
   posd = (ORDER_STATUS_DATA *) pTMon->pTMData;
   posd->w_id = pTPCC->sWId;
   if (GetShortKey(&posd->d_id,pIn,"DID*",pTPCC))
   {
     FormatMenu(pOut,pTPCC);
     return(TRUE);
   };
   if (posd->d_id < MIN_DId || posd->d_id > MAX_DId)
   {
      sprintf(pTPCC->ErrTxt,"DId Out of Range(%ld,%ld) - %ld",
         MIN_DId,MAX_DId,posd->d_id);
      pTPCC->iStatusId = ERR_DID_INVALID;
      FormatMenu(pOut,pTPCC);
      return(TRUE);
   };
   if (GetLongKey(&posd->c_id,pIn,"CID*",pTPCC))
   {
     FormatMenu(pOut,pTPCC);
     return(TRUE);
   };
   if (GetStringKey(posd->c_last,pIn,"CLT*",pTPCC,NAME_LEN))
   {
     FormatMenu(pOut,pTPCC);
     return(TRUE);
   };
   if (posd->c_id == 0 && posd->c_last[0] == 0)
   {
      strcpy(pTPCC->ErrTxt,"Error - Customer Id and Name Empty");
      pTPCC->iStatusId = ERR_IDANDNAME_EMPTY;
      FormatMenu(pOut,pTPCC);
      return(TRUE);
   };
   if (posd->c_id != 0 && posd->c_last[0] != 0)
   {
      strcpy(pTPCC->ErrTxt,
         "Error - Specify Customer Id or Name, not Both");
      pTPCC->iStatusId = ERR_IDANDNAME_ENTERED;
      FormatMenu(pOut,pTPCC);
      return(TRUE);
   };
   bTMRslt = TMTran(ORDERSTATUS_SERVICE,pTMon,&bTPRslt,&iTPRslt);
   posd = (ORDER_STATUS_DATA *) pTMon->pTMData;
   if (bTMRslt)
   {
      pTPCC->iStatusId = ERR_TM_INTERFACE;
      FormatMenu(pOut,pTPCC);
      return(TRUE);
   };
   if (bTPRslt)
   {
      sprintf(pTPCC->ErrTxt,
         "Order Status Service Returned Error(%ld): %s",
         iTPRslt,posd->execution_status);
      pTPCC->iStatusId = ERR_SERVICE_RSLT;
      FormatMenu(pOut,pTPCC);
      return(TRUE);
   };
   FormatRespHdr(pOut,"TPC-C Order-Status",pTPCC);
   sprintf(pOut + strlen(pOut),
      "<PRE>                                Order-Status<BR>"
      "Warehouse: %4.4d   District: %2.2d<BR>",
      posd->w_id,posd->d_id);
   FormatHTMLString(pTPCC->szWork,posd->c_first,NAME_LEN);
   FormatHTMLString(szWork2,posd->c_middle,2);
   FormatHTMLString(szWork3,posd->c_last,NAME_LEN);
   sprintf(pOut + strlen(pOut),
      "Customer: %4.4d   Name: %s %s %s<BR>"
      "Cust-Balance: $%9.2f<BR><BR>",
      posd->c_id,pTPCC->szWork,szWork2,szWork3,posd->c_balance);
   sprintf(pOut + strlen(pOut),
      "Order-Number: %8.8d   Entry-Date: %2.2d-%2.2d-%4.4d
%2.2d:%2.2d:%2.2d   Carrier-Number: %2.2d<BR>"
      "Supply-W     Item-Id    Qty     Amount      Delivery-Date<BR>",
      posd->o_id,posd->o_entry_d.day,posd->o_entry_d.month,
      posd->o_entry_d.year,posd->o_entry_d.hour,
      posd->o_entry_d.minute,posd->o_entry_d.second,
      posd->o_carrier_id);
   for(i = 0; i < posd->o_ol_cnt; i++)
   {
      sprintf(pOut + strlen(pOut),
         "  %4.4d       %6.6d     %2.2d     $%8.2f      %2.2d-%2.2d-
%4.4d<BR>",
         posd->OlOrderStatusData[i].ol_supply_w_id,
         posd->OlOrderStatusData[i].ol_i_id,
         posd->OlOrderStatusData[i].ol_quantity,
         posd->OlOrderStatusData[i].ol_amount,
         posd->OlOrderStatusData[i].ol_delivery_d.day,
         posd->OlOrderStatusData[i].ol_delivery_d.month,
         posd->OlOrderStatusData[i].ol_delivery_d.year);
   };
   sprintf(pOut + strlen(pOut),
      "<BR></PRE><HR><BR>%s</FORM>%s",szMenuList,HTMLTrailer);

   return(FALSE);
```

```
};   // ProcessOrderStatus

//============================================================================
//
// Function name: ProcessStockLevel
//
//    ProcessStockLevel extracts the input data fields from pIn,
//    processes the data, and returns a response in pOut.
//
//    Result:
//       FALSE - StockLevel processed successfully.
//       TRUE - StockLevel processing failed.
//
//============================================================================
BOOL ProcessStockLevel(CHAR * pIn,CHAR * pOut,TPCC_STATE * pTPCC)
{
   STOCK_LEVEL_DATA * psld;
   TMON_STATE * pTMon;
   BOOL bTMRslt;
   BOOL bTPRslt;
   INT iTPRslt;

   pTMon = &pTPCC->tsTMon;
   pTMon->lTMDataLen = sizeof(STOCK_LEVEL_DATA);
   memset(pTMon->pTMData,0,pTMon->lTMDataLen);
   psld = (STOCK_LEVEL_DATA *) pTMon->pTMData;
   psld->w_id = pTPCC->sWId;
   psld->d_id = pTPCC->sDId;
   psld->low_stock = 0;
   psld->execution_status[0] = 0;
   if (GetShortKey(&psld->thresh_hold,pIn,"TT*",pTPCC))
   {
     FormatMenu(pOut,pTPCC);
     return(TRUE);
   };
   if (psld->thresh_hold < MIN_THRESHOLD ||
       psld->thresh_hold > MAX_THRESHOLD)
   {
      sprintf(pTPCC->ErrTxt,"Threshold Out of Range(%ld,%ld) - %ld",
         MIN_THRESHOLD,MAX_THRESHOLD,psld->thresh_hold);
      pTPCC->iStatusId = ERR_THRESHOLD_RANGE;
      FormatMenu(pOut,pTPCC);
      return(TRUE);
   };

   bTMRslt = TMTran(STOCKLEVEL_SERVICE,pTMon,&bTPRslt,&iTPRslt);
   psld = (STOCK_LEVEL_DATA *) pTMon->pTMData;
   if (bTMRslt)
   {
      pTPCC->iStatusId = ERR_TM_INTERFACE;
      FormatMenu(pOut,pTPCC);
      return(TRUE);
   };
   if (bTPRslt)
   {
      sprintf(pTPCC->ErrTxt,
         "Stock Level Service Returned Error(%ld): %s",
         iTPRslt,psld->execution_status);
      pTPCC->iStatusId = ERR_SERVICE_RSLT;
      FormatMenu(pOut,pTPCC);
      return(TRUE);
   };

   FormatRespHdr(pOut,"TPC-C Stock Level",pTPCC);
   sprintf(pOut + strlen(pOut),
      "<PRE>                                Stock-Level<BR>"
      "Warehouse: %4.4d   District: %2.2d<BR><BR>"
      "Stock Level Threshold: %2.2d<BR><BR>"
      "low stock: %3.3ld</PRE><BR><HR>"
      "%s</FORM>%s",
      pTPCC->sWId,pTPCC->sDId,psld->thresh_hold,psld->low_stock,
      szMenuList,HTMLTrailer);

   return(FALSE);

};   // ProcessStockLevel

//============================================================================
//
// Function name: GetHidden
//
//============================================================================
BOOL GetHidden(CHAR * pMsg,UINT * uFormId,INT * iSyncId,INT * iTermId)
{
   CHAR * pPtr;
   BOOL bRslt = TRUE;

   // Extract TERMID
   pPtr = strstr(pMsg,TERMIDTOKEN);
   if (pPtr == NULL)
      goto xit;
   pPtr += strlen(TERMIDTOKEN);
   *iTermId = atoi(pPtr);

   // Extract SYNCID
   pPtr = strstr(pMsg,SYNCIDTOKEN);
   if (pPtr == NULL)
      goto xit;
   pPtr += strlen(SYNCIDTOKEN);
   *iSyncId = atoi(pPtr);

   // Extract FORMID
   pPtr = strstr(pMsg,FORMIDTOKEN);
   if (pPtr == NULL)
      goto xit;
   pPtr += strlen(FORMIDTOKEN);
   *uFormId = abs(atoi(pPtr));

   bRslt = FALSE;

xit:

   return(bRslt);

};   // GetHidden

//============================================================================
//
// Function name: GetCmd
//
//============================================================================
BOOL GetCmd(CHAR * pMsg,CHAR * pWork,UINT uLen)
```

```
{
   UINT u;
   CHAR * ptr;
   CHAR * pUpd;

   // Check for CMD key
   if (!(ptr = strstr(pMsg,CMDTOKEN)))
      return(CMD_NULL);
   ptr += sizeof(CMDTOKEN);
   pUpd = pWork;
   while (*ptr && *ptr != '&')
      *pUpd++ = *ptr++;
   *pUpd = 0;

   // Convert command name into command index
   for(u=0; u < CMD_MAX; u++)
   {
      if (!strcmp(szCmds[u],pWork))
         return(u);
   };

   // Command string not found
   return(CMD_NULL);

};   // GetCmd

//============================================================================
//
// Function name: GetLongKey
//
//============================================================================
BOOL GetLongKey(LONG * lRslt,CHAR * pHTML,CHAR * pKey,TPCC_STATE * pTPCC)
{
   if (GetKeyValue(pHTML,pKey,pTPCC->szWork,sizeof(pTPCC->szWork)))
   {
      sprintf(pTPCC->ErrTxt,"Error - Missing %s Key",pKey);
      pTPCC->iStatusId = ERR_MISSING_KEY;
      return(TRUE);
   };
   if (pTPCC->szWork[0] != 0 )
   {
      if (CheckNumeric(pTPCC->szWork))
      {
         sprintf(pTPCC->ErrTxt,"Error - %s Value Not Numeric",pKey);
         pTPCC->iStatusId = ERR_NOT_NUMERIC;
         return(TRUE);
      };
   };
   *lRslt = atol(pTPCC->szWork);
   return(FALSE);
};   // GetLongKey

//============================================================================
//
// Function name: GetIntKey
//
//============================================================================
BOOL GetIntKey(INT * iRslt,CHAR * pHTML,CHAR * pKey,TPCC_STATE * pTPCC)
{
   if (GetKeyValue(pHTML,pKey,pTPCC->szWork,sizeof(pTPCC->szWork)))
   {
      sprintf(pTPCC->ErrTxt,"Error - Missing %s Key",pKey);
      pTPCC->iStatusId = ERR_MISSING_KEY;
      return(TRUE);
   };
   if (pTPCC->szWork[0] != 0 )
   {
      if (CheckNumeric(pTPCC->szWork))
      {
         sprintf(pTPCC->ErrTxt,"Error - %s Value Not Numeric",pKey);
         pTPCC->iStatusId = ERR_NOT_NUMERIC;
         return(TRUE);
      };
   };
   *iRslt = atoi(pTPCC->szWork);
   return(FALSE);
};   // GetIntKey

//============================================================================
//
// Function name: GetShortKey
//
//============================================================================
BOOL GetShortKey(SHORT * sRslt,CHAR * pHTML,CHAR * pKey,TPCC_STATE *
pTPCC)
{
   if (GetKeyValue(pHTML,pKey,pTPCC->szWork,sizeof(pTPCC->szWork)))
   {
      sprintf(pTPCC->ErrTxt,"Error - Missing %s Key",pKey);
      pTPCC->iStatusId = ERR_MISSING_KEY;
      return(TRUE);
   };
   if (pTPCC->szWork[0] != 0 )
   {
      if (CheckNumeric(pTPCC->szWork))
      {
         sprintf(pTPCC->ErrTxt,"Error - %s Value Not Numeric",pKey);
         pTPCC->iStatusId = ERR_NOT_NUMERIC;
         return(TRUE);
      };
   };
   *sRslt = (SHORT) atoi(pTPCC->szWork);
   return(FALSE);
};   // GetShortKey

//============================================================================
//
// Function name: GetStringKey
//
//============================================================================
BOOL GetStringKey(CHAR * szRslt,CHAR * pHTML,CHAR * pKey,
                  TPCC_STATE * pTPCC,UINT uMax)
{
   UINT uLen;
   if (GetKeyValue(pHTML,pKey,pTPCC->szWork,sizeof(pTPCC->szWork)))
   {
      sprintf(pTPCC->ErrTxt,"Error - Missing %s Key",pKey);
      pTPCC->iStatusId = ERR_MISSING_KEY;
      return(TRUE);
   };
   uLen = strlen(pTPCC->szWork);
   if (uLen > uMax)
```

```
   {
      sprintf(pTPCC->ErrTxt,
         "Error - %s Key Input (%ld) Too Long (%ld)"
         ,pKey,uLen,uMax);
      pTPCC->iStatusId = ERR_INPUT_TOOLONG;
      return(TRUE);
   };
   _strupr(pTPCC->szWork);
   strcpy(szRslt,pTPCC->szWork);
   return(FALSE);
};   // GetStringKey

//========================================================================
//
// Function name: GetAmountKey
//
//========================================================================
BOOL GetAmountKey(DOUBLE * dRslt,CHAR * pHTML,CHAR * pKey,
                  TPCC_STATE * pTPCC)
{
   CHAR * ptr;
   BOOL bInvalid = FALSE;

   if (GetKeyValue(pHTML,pKey,pTPCC->szWork,sizeof(pTPCC->szWork)))
   {
      sprintf(pTPCC->ErrTxt,"Error - Missing %s Key",pKey);
      pTPCC->iStatusId = ERR_MISSING_KEY;
      return(TRUE);
   };
   ptr = pTPCC->szWork;
   while(*ptr)
   {
      if (*ptr == '.')
      {
         ptr++;
         if (!*ptr)
            break;
         if (*ptr < '0' || *ptr > '9')
         {
            bInvalid = TRUE;
            break;
         };
         ptr++;
         if (!*ptr)
            break;
         if (*ptr < '0' || *ptr > '9')
         {
            bInvalid = TRUE;
            break;
         };
         ptr++;
         if (*ptr)
         {
            bInvalid = TRUE;
            break;
         };
         break;
      }
      else
      if (*ptr < '0' || *ptr > '9')
      {
         bInvalid = TRUE;
         break;
      };
            ptr++;
       };   // while(!*ptr)

   if (!bInvalid)
      *dRslt = atof(pTPCC->szWork);
   else
   {
      sprintf(pTPCC->ErrTxt,
         "Error - Invalid Amount Format (%s)",pTPCC->szWork);
      pTPCC->iStatusId = ERR_AMOUNT_BADFORM;
   };

   return(bInvalid);

};   // GetAmountKey

//========================================================================
//
// Function name: GetKeyValue
//   This function parses an HTTP formatted string for specific key
//   values.  HTTP keys terminate with '='.  HTTP values terminate
//   with an '&' or '\0'.
//
//    Result:
//       FALSE - Key found, string value return in pValue
//       TRUE - Key not found
//
//========================================================================
BOOL GetKeyValue(CHAR * pHTML,CHAR * pKey,CHAR * pValue,UINT uMax)
{
   CHAR * ptr;
   if (!(ptr=strstr(pHTML,pKey)))
      return(TRUE);
   if (!(ptr=strchr(ptr,'=')))
      return(TRUE);
   ptr++;
   uMax--;
   while (*ptr && *ptr != '&' && uMax)
   {
      *pValue++ = *ptr++;
      uMax--;
   };
   *pValue = 0;
   return(FALSE);
};   // GetKeyValue

//========================================================================
//
// Function name: FormatLogin
//
//========================================================================
VOID FormatLogin(CHAR * pOut,CHAR * pAddText)
{
   sprintf(pOut,"%s<BR>%s<BR>%s",szFormLogin,pAddText,HTMLTrailer);
};   // FormatLogin

//========================================================================
//
```

```
// Function name: FormatMenu
//
//==============================================================================
VOID FormatMenu(CHAR * pOut,TPCC_STATE * pTPCC)
{
   sprintf(pOut,
      "%s<HTML><HEAD><TITLE>TPC-C MainMenu</TITLE></HEAD><BODY>"
      "Select Desired Transaction.<BR><HR>"
      "<FORM ACTION=\"tpcc.dll\"METHOD=\"GET\">"
      "<INPUT TYPE=\"hidden\" NAME=\"STATUSID\" VALUE=\"%d\">"
      "<INPUT TYPE=\"hidden\" NAME=\"TERMID\" VALUE=\"%d\">"
      "<INPUT TYPE=\"hidden\" NAME=\"SYNCID\" VALUE=\"%d\">"
      "<INPUT TYPE=\"hidden\" NAME=\"FORMID\" VALUE=\"%d\">"
      "%s</FORM><BR>%s<BR>%s",
      HTTPHdr,pTPCC->iStatusId,pTPCC->iTermId,pTPCC->iSyncId,FORM_MENU,
      szMenuList,pTPCC->ErrTxt,HTMLTrailer);
};   // FormatMenu

//==============================================================================
//
// Function name: FormatNewOrder
//
//==============================================================================
VOID FormatNewOrder(CHAR * pOut,TPCC_STATE * pTPCC)
{
   pTPCC->uFormId = FORM_NEWORDER;
   FormatFormHdr(pOut,"TPC-C New Order",pTPCC);
   sprintf(pOut + strlen(pOut),
      "<PRE>                                  New Order<BR>"
      "Warehouse: %4.4d   District: <INPUT NAME=\"DID*\" SIZE=1>
Date:<BR>"
               "Customer:  <INPUT NAME=\"CID*\" SIZE=4>   Name:
Credit:      %Disc:<BR>"
      "Order Number:           Number of Lines:           W_tax:
D_tax:<BR><BR>"
      " Supp_W  Item_Id  Item Name                 Qty  Stock  B/G  Price
Amount<BR>"
      " <INPUT NAME=\"SP00*\" SIZE=4>  <INPUT NAME=\"IID00*\" SIZE=6>
<INPUT NAME=\"Qty00*\" SIZE=1><BR>"
      " <INPUT NAME=\"SP01*\" SIZE=4>  <INPUT NAME=\"IID01*\" SIZE=6>
<INPUT NAME=\"Qty01*\" SIZE=1><BR>"
      " <INPUT NAME=\"SP02*\" SIZE=4>  <INPUT NAME=\"IID02*\" SIZE=6>
<INPUT NAME=\"Qty02*\" SIZE=1><BR>"
      " <INPUT NAME=\"SP03*\" SIZE=4>  <INPUT NAME=\"IID03*\" SIZE=6>
<INPUT NAME=\"Qty03*\" SIZE=1><BR>"
      " <INPUT NAME=\"SP04*\" SIZE=4>  <INPUT NAME=\"IID04*\" SIZE=6>
<INPUT NAME=\"Qty04*\" SIZE=1><BR>"
      " <INPUT NAME=\"SP05*\" SIZE=4>  <INPUT NAME=\"IID05*\" SIZE=6>
<INPUT NAME=\"Qty05*\" SIZE=1><BR>"
      " <INPUT NAME=\"SP06*\" SIZE=4>  <INPUT NAME=\"IID06*\" SIZE=6>
<INPUT NAME=\"Qty06*\" SIZE=1><BR>"
      " <INPUT NAME=\"SP07*\" SIZE=4>  <INPUT NAME=\"IID07*\" SIZE=6>
<INPUT NAME=\"Qty07*\" SIZE=1><BR>"
      " <INPUT NAME=\"SP08*\" SIZE=4>  <INPUT NAME=\"IID08*\" SIZE=6>
<INPUT NAME=\"Qty08*\" SIZE=1><BR>"
      " <INPUT NAME=\"SP09*\" SIZE=4>  <INPUT NAME=\"IID09*\" SIZE=6>
<INPUT NAME=\"Qty09*\" SIZE=1><BR>"
      " <INPUT NAME=\"SP10*\" SIZE=4>  <INPUT NAME=\"IID10*\" SIZE=6>
<INPUT NAME=\"Qty10*\" SIZE=1><BR>"
      " <INPUT NAME=\"SP11*\" SIZE=4>  <INPUT NAME=\"IID11*\" SIZE=6>
<INPUT NAME=\"Qty11*\" SIZE=1><BR>"
      " <INPUT NAME=\"SP12*\" SIZE=4>  <INPUT NAME=\"IID12*\" SIZE=6>
<INPUT NAME=\"Qty12*\" SIZE=1><BR>"
      " <INPUT NAME=\"SP13*\" SIZE=4>  <INPUT NAME=\"IID13*\" SIZE=6>
<INPUT NAME=\"Qty13*\" SIZE=1><BR>"
      " <INPUT NAME=\"SP14*\" SIZE=4>  <INPUT NAME=\"IID14*\" SIZE=6>
<INPUT NAME=\"Qty14*\" SIZE=1><BR>"
      "Execution Status:
Total:<BR><HR>"
      "<INPUT TYPE=\"submit\"NAME=\"CMD\" VALUE=\"Process\">"
      "<INPUT TYPE=\"submit\"NAME=\"CMD\" VALUE=\"Menu\">"
      "</FORM>%s",
      pTPCC->sWId,HTMLTrailer);
};   // FormatNewOrder

//==============================================================================
//
// Function name: FormatPayment
//
//==============================================================================
VOID FormatPayment(CHAR * pOut,TPCC_STATE * pTPCC)
{
   pTPCC->uFormId = FORM_PAYMENT;
   FormatFormHdr(pOut,"TPC-C Payment",pTPCC);
   sprintf(pOut + strlen(pOut),
      "<PRE>                                  Payment<BR>"
      "Date:<BR><BR>"
      "Warehouse: %4.4d"
      "                          District: <INPUT NAME=\"DID*\"
SIZE=1><BR><BR><BR><BR><BR>"
      "Customer: <INPUT NAME=\"CID*\" SIZE=4>"
      "Cust-Warehouse: <INPUT NAME=\"CWI*\" SIZE=4>  "
      "Cust-District: <INPUT NAME=\"CDI*\" SIZE=1><BR>"
      "Name:                        <INPUT NAME=\"CLT*\" SIZE=16>
Since:<BR>"
      "                                                    Credit:<BR>"
      "                                                    Disc:<BR>"
      "                                                    Phone:<BR><BR>"
      "Amount Paid:          $<INPUT NAME=\"HAM*\" SIZE=7>      New Cust
Balance:<BR>"
      "Credit Limit:<BR><BR>Cust-Data: <BR><BR><BR><BR></PRE><HR>"
      "<INPUT TYPE=\"submit\"NAME=\"CMD\" VALUE=\"Process\">"
      "<INPUT TYPE=\"submit\"NAME=\"CMD\" VALUE=\"Menu\">"
      "</FORM>%s",
      pTPCC->sWId,HTMLTrailer);
};   // FormatPayment

//==============================================================================
//
// Function name: FormatDelivery
//
//==============================================================================
VOID FormatDelivery(CHAR * pOut,TPCC_STATE * pTPCC)
{
   pTPCC->uFormId = FORM_DELIVERY;
   FormatFormHdr(pOut,"TPC-C Delivery",pTPCC);
   sprintf(pOut + strlen(pOut),
      "<PRE>                                  Delivery<BR>"
      "Warehouse: %4.4d<BR><BR>"
      "Carrier Number: <INPUT NAME=\"OCD*\" SIZE=1><BR><BR>"
      "Execution Status:<BR></PRE><HR>"
      "<INPUT TYPE=\"submit\"NAME=\"CMD\" VALUE=\"Process\">"
```

```
      "<INPUT TYPE=\"submit\"NAME=\"CMD\" VALUE=\"Menu\">"
      "</FORM>%s",
      pTPCC->sWId,HTMLTrailer);
};   // FormatDelivery

//================================================================================
//
// Function name: FormatOrderStatus
//
//================================================================================
VOID FormatOrderStatus(CHAR * pOut,TPCC_STATE * pTPCC)
{
   pTPCC->uFormId = FORM_ORDERSTATUS;
   FormatFormHdr(pOut,"TPC-C Order-Status",pTPCC);
   sprintf(pOut + strlen(pOut),
      "<PRE>                                Order-Status<BR>"
      "Warehouse: %4.4d   "
      "District: <INPUT NAME=\"DID*\" SIZE=1><BR>"
                "Customer: <INPUT NAME=\"CID*\" SIZE=4>   Name:
<INPUT NAME=\"CLT*\" SIZE=23><BR>"
      "Cust-Balance:<BR><BR>"
      "Order-Number:            Entry-Date:                        Carrier-
Number:<BR>"
      "Supply-W     Item-Id    Qty     Amount      Delivery-
Date<BR></PRE><HR>"
      "<INPUT TYPE=\"submit\"NAME=\"CMD\" VALUE=\"Process\">"
      "<INPUT TYPE=\"submit\"NAME=\"CMD\" VALUE=\"Menu\">"
      "</FORM>%s",
      pTPCC->sWId,HTMLTrailer);
};   // FormatOrderStatus

//================================================================================
//
// Function name: FormatStockLevel
//
//================================================================================
VOID FormatStockLevel(CHAR * pOut,TPCC_STATE * pTPCC)
{
   pTPCC->uFormId = FORM_STOCKLEVEL;
   FormatFormHdr(pOut,"TPC-C Stock Level",pTPCC);
   sprintf(pOut + strlen(pOut),
      "<PRE>                                Stock-Level<BR>"
      "Warehouse: %4.4d   District: %2.2d<BR><BR>"
      "Stock Level Threshold: <INPUT NAME=\"TT*\"SIZE=2><BR><BR>"
      "low stock:    <BR><HR>"
      "<INPUT TYPE=\"submit\"NAME=\"CMD\" VALUE=\"Process\">"
      "<INPUT TYPE=\"submit\"NAME=\"CMD\" VALUE=\"Menu\">"
      "</FORM>%s",
      pTPCC->sWId,pTPCC->sDId,HTMLTrailer);
};   // FormatStockLevel

//================================================================================
//
// Function name: FormatFormHdr
//
//================================================================================
VOID FormatFormHdr(CHAR * pOut,CHAR * pTitle,TPCC_STATE * pTPCC)
{
   sprintf(pOut,
      "%s<HTML><HEAD><TITLE>%s</TITLE></HEAD>"
      "<FORM ACTION=\"tpcc.dll\" METHOD=\"GET\">"
      "<INPUT TYPE=\"hidden\" NAME=\"PI*\" VALUE=\"\">"
      "<INPUT TYPE=\"hidden\" NAME=\"STATUSID\" VALUE=\"0\">"
      "<INPUT TYPE=\"hidden\" NAME=\"FORMID\" VALUE=\"%d\">"
      "<INPUT TYPE=\"hidden\" NAME=\"TERMID\" VALUE=\"%d\">"
      "<INPUT TYPE=\"hidden\" NAME=\"SYNCID\" VALUE=\"%d\">",
      HTTPHdr,pTitle,pTPCC->uFormId,pTPCC->iTermId,pTPCC->iSyncId);
};   // FormatFormHdr

//================================================================================
//
// Function name: FormatRespHdr
//
//================================================================================
VOID FormatRespHdr(CHAR * pOut,CHAR * pTitle,TPCC_STATE * pTPCC)
{
   sprintf(pOut,
      "%s<HTML><HEAD><TITLE>%s</TITLE></HEAD>"
      "<FORM ACTION=\"tpcc.dll\" METHOD=\"GET\">"
      "<INPUT TYPE=\"hidden\" NAME=\"STATUSID\" VALUE=\"%d\">"
      "<INPUT TYPE=\"hidden\" NAME=\"FORMID\" VALUE=\"%d\">"
      "<INPUT TYPE=\"hidden\" NAME=\"TERMID\" VALUE=\"%d\">"
      "<INPUT TYPE=\"hidden\" NAME=\"SYNCID\" VALUE=\"%d\">",
      HTTPHdr,pTitle,pTPCC->iStatusId,pTPCC->uFormId,
      pTPCC->iTermId,pTPCC->iSyncId);
};   // FormatRespHdr

//================================================================================
//
// Function name: FormatHTMLString
//
//    Encodes HTML special characters.  If necessary, space fills
//    to pOut to total uLen characters.
//
//================================================================================
VOID FormatHTMLString(CHAR * pOut,CHAR * pIn,UINT uLen)
{
   while (uLen && *pIn)
   {
      *pOut++ = *pIn++;
      uLen--;
   };   // while (uLen && *pIn)
   while(uLen--)
      *pOut++ = ' ';
       *pOut = 0;
};   // FormatHTMLString

//================================================================================
//
// Function name: FormatString
//
//    Encodes formatted string for HTML transmission.
//
//================================================================================
VOID FormatString(CHAR * pOut,CHAR * pPic,CHAR * pIn)
{
   while(*pPic)
   {
      if (*pPic == 'X' )
      {
         if (*pIn)
            *pOut++ = *pIn++;
```

```
         else
            *pOut++ = ' ';
      }
      else
         *pOut++ = *pPic;
      pPic++;
   };
   *pOut = 0;
};   // FormatString

//============================================================================
// FUNCTION: UtilStrCpy
//
//    Copies n characters from string pSrc to pDst and places a null
//    null character at the end of the destination string.  Unlike
//    strncpy this function ensures that the result string is always
//    null terminated.
//
//============================================================================
VOID UtilStrCpy(CHAR * pDest,CHAR * pSrc,INT n)
{
   strncpy(pDest,pSrc,n);
   pDest[n] = '\0';
   return;
};   // UtilStrCpy

//============================================================================
//
// Function name: CheckNumeric
//
//    Result
//       FALSE - string is all numeric
//       TRUE - sting contains non-numeric characters
//
//============================================================================
BOOL CheckNumeric(CHAR * pNum)
{
   if (*pNum == 0 )
      return(TRUE);
   while (*pNum && isdigit(*pNum))
      pNum++;
   return(*pNum);
};   // CheckNumeric
```

term.h

```
// term.h

#include <sys\timeb.h>

#define TMILLI_TIMEOUT 3600000       // One hour

typedef struct
{
   BOOL bInUse;                        // In use flag
   INT iTermId;                        // TermId
   LPVOID ConnID;                      // Connection Id
   INT  iSyncId;                       // Sync Id
   SHORT sWId;                         // TPCC WareHouse Id
   SHORT sDId;                         // TPCC District Id
   struct _timeb tbLastAccess;         // Last activity timestamp
} TERM_STATE;

BOOL TermInit(INT iSetMaxTerm);
VOID TermTerm(VOID);
TERM_STATE * TermAlloc(VOID);
TERM_STATE * TermGet(INT iTermId);
BOOL TermFree(INT iTermId);
```

term.c

```
// term.c
//
// Copyright Unisys, 1997
//
#include <windows.h>
#include <stdio.h>
#include "diagio.h"
#include "timesupp.h"
#include "term.h"

TERM_STATE * pTArray;
INT iNextTerm = 0;
INT iMaxTerm = 0;
CRITICAL_SECTION csTerm;

VOID TermMaint(VOID);

//============================================================================
//
// Function name: TermInit
//    Creates and initializes the first TERMINITIAL TArray entries.
//    Initializes critical section to control access to TArray.  Assumes
//    access to function is single threaded, no other threads will start
//    until this function completes and that function is called once
//    (DLL_PROCESS_ATTACH).
//
// Returns:
//    FALSE TArray allocated and initialized
//    TRUE  TArray allocation failure
//
//============================================================================
BOOL TermInit(INT iSetMaxTerm)
{
   INT iTermId;
   CHAR szDiag[MAX_DIAG_SZ];
   if (pTArray != NULL)
   {
      sprintf(szDiag,"TermInit(%ld): TArray Already Initialized\n",
         GetCurrentThreadId());
      DiagIoWrite(szDiag,DIAG_ERROR);
      return(TRUE);
   };
   InitializeCriticalSection(&csTerm);
   iMaxTerm = iSetMaxTerm;
   pTArray = (TERM_STATE *) malloc(sizeof(TERM_STATE) * (iMaxTerm + 1));
   if (pTArray == NULL)
   {
```

```
      sprintf(szDiag,"TermInit(%ld): malloc failed (%ld)\n",
         GetCurrentThreadId(),GetLastError());
      DiagIoWrite(szDiag,DIAG_ERROR);
      return(TRUE);
   }
   for (iTermId = 1; iTermId <= iMaxTerm; iTermId++)
      TermFree(iTermId);
   iNextTerm = 1;
   return(FALSE);
};   // TermInit

//=========================================================================
//
// Function name: TermTerm
//    Frees TArray and deletes csTerm critical section.  Assumes access
//    to function is single threaded and no other threads are actively
//    accessing TArray entries (DLL_PROCESS_DETACH).
//
//=========================================================================
VOID TermTerm(VOID)
{
   DeleteCriticalSection(&csTerm);
   if (pTArray != NULL)
      free(pTArray);
   iNextTerm = 0;
   iMaxTerm =0;
};   // TermTerm

//=========================================================================
//
// Function name: TermAlloc
//    Allocates empty TArray.  Uses iNextTerm to start search.
//
// Returns:
//    > 0   TArray entry index (iTermId)
//    < 0   Empty TArray entry not available
//
//=========================================================================
TERM_STATE * TermAlloc(VOID)
{
   INT iTermId = -1;
   if (pTArray == NULL)
   {
      CHAR szDiag[MAX_DIAG_SZ];
      sprintf(szDiag,"TermAlloc(%ld): Term Array Not Allocated\n",
         GetCurrentThreadId());
      DiagIoWrite(szDiag,DIAG_ERROR);
      return(NULL);
   };
   EnterCriticalSection(&csTerm);
   __try
   {
      while(iNextTerm <= iMaxTerm)
      {
         if (!pTArray[iNextTerm].bInUse)
         {
            pTArray[iNextTerm].bInUse = TRUE;
            _ftime(&pTArray[iNextTerm].tbLastAccess);
            iTermId = iNextTerm;
            iNextTerm++;
            break;
         };
         iNextTerm++;
      };   // while(iNextTerm <= iMaxTerm) (1st Try)
      if (iTermId <= 0)
      {
         // No entry found.  Perform maint and try again
         TermMaint();
         iNextTerm = 1;
         while(iNextTerm <= iMaxTerm)
         {
            if (!pTArray[iNextTerm].bInUse)
            {
               pTArray[iNextTerm].bInUse = TRUE;
               _ftime(&pTArray[iNextTerm].tbLastAccess);
               iTermId = iNextTerm;
               iNextTerm++;
               break;
            };
            iNextTerm++;
         };   // while(iNextTerm <= iMaxTerm) (2nd Try)
      };   // if (iTermId <= 0)
      if (iTermId <= 0)
         iNextTerm = 1;
   }
   __finally
   {
      LeaveCriticalSection(&csTerm);
   };

   if (iTermId > 0)
      return(&pTArray[iTermId]);
   else
      return(NULL);


};   // TermAlloc

//=========================================================================
//
// Function name: TermMaint
//    Clears entries whose last access time exceeds TMILLI_TIMEOUT.
//    Assumes caller has entered csTerm.
//
//=========================================================================
VOID TermMaint(VOID)
{
   INT iTermId;
   TMILLI tmElapsed;
   // Free entries that have timed out
   for (iTermId = 1; iTermId <= iMaxTerm; iTermId++)
   {
      if (pTArray[iTermId].bInUse)
      {
         tmElapsed = TimebElapsed(&pTArray[iTermId].tbLastAccess);
         if (tmElapsed > TMILLI_TIMEOUT)
            TermFree(iTermId);
      };
   };
};   // TermMaint

//=========================================================================
```

```
//
// Function name: TermGet
//    Returns pointer to TArray slot at iTermId.
//
// Returns:
//    FALSE TArray entry made available
//    TRUE  iTermId invalid.
//
//=============================================================================
TERM_STATE * TermGet(INT iTermId)
{
   TERM_STATE * pTerm;
   TMILLI tmElapsed;
   if (iTermId <= 0 || iTermId > iMaxTerm)
   {
      CHAR szDiag[MAX_DIAG_SZ];
      sprintf(szDiag,"TermGet(%ld): Invalid TermId (%ld)\n",
         GetCurrentThreadId(),iTermId);
      DiagIoWrite(szDiag,DIAG_ERROR);
      return(NULL);
   };
   pTerm = &pTArray[iTermId];
   if (!pTerm->bInUse)
      return(NULL);
   tmElapsed = TimebElapsed(&pTerm->tbLastAccess);
   if (tmElapsed > TMILLI_TIMEOUT)
      return(NULL);   // Entry destined to be freed by maint
   _ftime(&pTArray[iTermId].tbLastAccess);
   return(&pTArray[iTermId]);
};   // TermGet

//=============================================================================
//
// Function name: TermFree
//    Initializes contents of TArray slot at iTermId.
//
// Returns:
//    FALSE TArray entry made available
//    TRUE  iTermId invalid.
//
//=============================================================================
BOOL TermFree(INT iTermId)
{
   TERM_STATE * pTerm;
   if (iTermId <= 0 || iTermId > iMaxTerm)
   {
      CHAR szDiag[MAX_DIAG_SZ];
      sprintf(szDiag,"TermFree(%ld): Invalid TermId (%ld)\n",
         GetCurrentThreadId(),iTermId);
      DiagIoWrite(szDiag,DIAG_ERROR);
      return(TRUE);
   };
   pTerm = &pTArray[iTermId];
   pTerm->ConnID = 0;
   pTerm->sWId = 0;
   pTerm->sDId = 0;
   pTerm->iSyncId = 0;
   pTerm->iTermId = iTermId;
   TimebClear(&pTerm->tbLastAccess);
   pTerm->bInUse = FALSE;
};   // TermFree
```

tmon.h

```
// tmon.h

typedef struct
{
   CHAR * pszErrTxt;                    // Error text
   CHAR * pTMData;                      // TM buffer area
   LONG lTMDataLen;                     // TM buffer len
} TMON_STATE;

VOID TMonInit(INT iSetMaxMsg);
VOID TMonTerm(VOID);
BOOL TMInit(TMON_STATE * pTMon);
VOID TMDone(TMON_STATE * pTMon);
BOOL TMTran(CHAR * pService,TMON_STATE * pTMon,
            BOOL * bTPRslt,INT * iTPRslt);
BOOL TMPost(CHAR * pService,TMON_STATE * pTMon);
```

tmon.c

```
// tmon.c
//
// Copyright Unisys, 1997
//
#include <windows.h>
#include <stdio.h>
#include <atmi.h>
#include "tmon.h"

INT iTMMaxSz;

//=============================================================================
//
// Function name: TMonInit
//
//=============================================================================
VOID TMonInit(INT iSetMaxMsg)
{
   iTMMaxSz = iSetMaxMsg;
};   // TMonInit


//=============================================================================
//
// Function name: TMonTerm
//
//=============================================================================
VOID TMonTerm(VOID)
{
};   // TMonTerm

//=============================================================================
//
// Function name: TMInit
//
//    Result:
//       FALSE    Initialization completed successfully
//       TRUE     Initialization failed
//
```

```
//====================================================================
BOOL TMInit(TMON_STATE * pTMon)
{
   BOOL bRslt = FALSE;
   TPINIT * tpinfo;

   // Must have ErrTxt message area set before init
   if (pTMon->pszErrTxt == NULL)
      return(TRUE);
   tpinfo = (TPINIT *) tpalloc("TPINIT",NULL,TPINITNEED(20));
   memset(tpinfo,0,sizeof(TPINIT));
   tpinfo->flags=TPMULTICONTEXTS;
   sprintf(tpinfo->cltname,"tpcc%d",GetCurrentThreadId());

   if (tpinit(tpinfo) == -1)
   {
      sprintf(pTMon->pszErrTxt,"TPInit Failed(%ld)",tperrno);
      bRslt = TRUE;
   }
   else
   {
      pTMon->pTMData = tpalloc("CARRAY",NULL,iTMMaxSz);
      if (pTMon->pTMData == NULL)
      {
         sprintf(pTMon->pszErrTxt,"TPAlloc Failed(%ld)",tperrno);
         bRslt = TRUE;
      };
   };

   return(bRslt);

};   // TMInit

//====================================================================
//
// Function name: TMDone
//
//====================================================================
VOID TMDone(TMON_STATE * pTMon)
{
   tpfree(pTMon->pTMData);
   tpterm();
};   // TMDone

//====================================================================
//
// Function name: TMTran
//
//    Result:
//       FALSE    call completed. bTPRslt contains outcome (FALSE tran
//                success).  iTPRslt contains application returned
//                result code.
//       TRUE     TM interface error, ErrTxt has diagnostic.
//
//====================================================================
BOOL TMTran(CHAR * pService,TMON_STATE * pTMon,
            BOOL * bTPRslt,INT * iTPRslt)
{
   BOOL bRslt = FALSE;
   INT iGRply;

   iGRply = tpcall(pService,pTMon->pTMData,iTMMaxSz,
      &pTMon->pTMData,&pTMon->lTMDataLen,TPNOTIME | TPSIGRSTRT);
   if (iGRply != -1)
   {
      *iTPRslt = tpurcode;
      *bTPRslt = FALSE;
   }
   else
   if (tperrno == TPESVCFAIL)
   {
      *iTPRslt = tpurcode;
      *bTPRslt = TRUE;
   }
   else
   {
      sprintf(pTMon->pszErrTxt,"TPCall Failed (%ld)",tperrno);
      bRslt = TRUE;
   };
   return(bRslt);
};   // TMTran

//====================================================================
//
// Function name: TMPost
//
//    Result:
//       FALSE    transaction submitted with no response expected
//       TRUE     tpacall failed, ErrTxt has diagnostic
//
//====================================================================
BOOL TMPost(CHAR * pService,TMON_STATE * pTMon)
{
   BOOL bRslt = FALSE;
   INT iCD;

   iCD = tpacall(pService,pTMon->pTMData,iTMMaxSz,TPNOREPLY);
   if (iCD == -1)
   {
      sprintf(pTMon->pszErrTxt,"TPACall Failed (%ld)",tperrno);
      bRslt = TRUE;
   };
   return(bRslt);
};   // TMPost
```

timesupp.h

```
// timesupp.h

#include <windows.h>
#include <time.h>
#include <sys\timeb.h>

#define TIMEBSEED_MOD 10000
#define TIMEBSEED_SHIFT 1000
#define TIMEB_STRING_SZ 23
#define TIMEB_STRING_DATESZ 10
#define TIMEB_STRING_TIMEOFFSET 11
#define TIMEB_STRING_TIMESZ 12

typedef ULONG TMILLI;
```

```
TMILLI TimebDiff(struct _timeb * p_tb1, struct _timeb * p_tb2);
VOID TimebCopy(struct _timeb * p_tbDest, struct _timeb * p_tbSource);
TMILLI TimebElapsed(struct _timeb * p_tb1);
VOID TimebClear(struct _timeb * p_tb1);
CHAR * TimebToString(struct _timeb * p_tb1,CHAR * psz,BOOL bMillis);
BOOL TimebFromString(struct _timeb * p_tb1,CHAR * psz);
VOID TimebAddSecs(struct _timeb * p_tb1,INT iSeconds);
ULONG TimebSeed(VOID);
```

timesupp.c

```
// timesupp.c
//
// Copyright Unisys, 1997
//

#include <stdio.h>
#include "timesupp.h"

//=========================================================================
//
// Function name: TimebCopy
//    Structure contents copy of _timeb source to _timeb dest.
//
//=========================================================================
VOID TimebCopy(struct _timeb * p_tbDest, struct _timeb * p_tbSource)
{
   p_tbDest->time = p_tbSource->time;
   p_tbDest->millitm = p_tbSource->millitm;
   p_tbDest->dstflag = p_tbSource->dstflag;
   p_tbDest->timezone = p_tbSource->timezone;

};   // TimebCopy

//=========================================================================
//
// Function name: TimebDiff
//    Time difference in milliseconds between _timeb _t1 and _timeb _t2.
//
//=========================================================================
TMILLI TimebDiff(struct _timeb * p_tb1, struct _timeb * p_tb2)
{
   LONG lRslt;
   lRslt = ((p_tb2->time - p_tb1->time) * 1000) +
               (p_tb2->millitm - p_tb1->millitm);
   if (lRslt < 0)
      return(0);
   else
      return((TMILLI) lRslt);

};   // TimebDiff

//=========================================================================
//
// Function name: TimebElaspsed
//
//=========================================================================
TMILLI TimebElapsed(struct _timeb * p_tb1)
{
   struct _timeb _tb2;
   _ftime(&_tb2);
   return (TimebDiff(p_tb1,&_tb2));

};   // TimebElapsed

//=========================================================================
//
// Function name: TimebClear
//
//=========================================================================
VOID TimebClear(struct _timeb * p_tb1)
{
   p_tb1->time = 0;
   p_tb1->millitm = 0;

};   // TimebClear

//=========================================================================
//
// Function name: TimebToString
//    Converts timeb to yyyy:mm:dd,hh:mm:ss.sss format
//
//=========================================================================
CHAR * TimebToString(struct _timeb * p_tb1,CHAR * psz,BOOL bMillis)
{
   struct tm * ptm;
   ptm = localtime(&p_tb1->time);
   sprintf(psz,"%4.4d/%2.2d/%2.2d,%2.2d:%2.2d:%2.2d",
      ptm->tm_year + 1900,ptm->tm_mon + 1,ptm->tm_mday,
      ptm->tm_hour,ptm->tm_min,ptm->tm_sec);
   if (bMillis)
      sprintf(psz + strlen(psz),".%3.3d",p_tb1->millitm);
   return(psz);
};   // TimebToString

//=========================================================================
//
// Function name: TimebFromString
//    Converts yyyy:mm:dd,hh:mm:ss.sss (TimebToString) format to timeb
//
//=========================================================================
BOOL TimebFromString(struct _timeb * p_tb1,CHAR * psz)
{
   struct tm tmTime;
   struct tm * ptm;
   UINT uLen;

   ptm = &tmTime;
   uLen = strlen(psz);
   if (uLen < (TIMEB_STRING_SZ - 4))   // millis are optional
   {
      p_tb1->time = 0;
      p_tb1->millitm = 0;
      return (TRUE);
   };
   // Clear fields that won't be set
   ptm->tm_wday = 0;
   ptm->tm_yday = 0;
   ptm->tm_isdst = -1;
   // Set tm struct fields from string
```

```
   ptm->tm_year = (atoi(psz)) - 1900;
   psz += 5;
   ptm->tm_mon = (atoi(psz)) - 1;
   psz += 3;
   ptm->tm_mday = atoi(psz);
   psz += 3;
   ptm->tm_hour = atoi(psz);
   psz += 3;
   ptm->tm_min = atoi(psz);
   psz +=3;
   ptm->tm_sec = atoi(psz);
   if (uLen >= TIMEB_STRING_SZ)   // Millis present
   {
      psz += 3;
      p_tb1->millitm = atoi(psz);
   };
   p_tb1->time = mktime(ptm);
   return(FALSE);
};   // TimebFromString

//=========================================================================
//
// Function name: TimebAddSecs
//
//=========================================================================
VOID TimebAddSecs(struct _timeb * p_tb1,INT iSeconds)
{
   p_tb1->time += iSeconds;
};   // TimebAddSecs
```

diagio.h

```
// diagio.h

// Environment variable defaults
#define DEFAULTDIAGLEVEL DIAG_INFO
#define DEFAULTEVENTLOG 0

#define DIAGNOSTICS TRUE
#define MAX_DIAG_SZ 2000

// Severity level of diagnostic report
#define DIAG_FORCE 1
#define DIAG_ERROR 2
#define DIAG_STATE 3
#define DIAG_INFO 4

VOID DiagIoInit(CHAR * pDiagId,BOOL bConsole,BOOL bEvent,UINT uLevel);
VOID DiagIoTerm(VOID);
VOID DiagIoWrite(CHAR * pDiagBuffer, UINT uSeverity);
```

diagio.c

```
// diagio.c
//
// Copyright Unisys, 1997
//
#include <windows.h>
#include <stdio.h>
#include "diagio.h"

CRITICAL_SECTION csDiagIo;
HANDLE hEventLog = NULL;
UINT uDiagLevel;
BOOL bEventLog;
BOOL bConsoleLog;
CHAR * pDiagHdr;
CHAR * pEventHost;
CHAR * pErrHdr =
   {"*** ERROR *** ERROR *** ERROR *** ERROR *** ERROR ***"};

INT WriteEventLog(CHAR * pDMsgs[],UINT uMsgCnt,UINT uSeverity);

//=========================================================================
//
// Function name: DiagIoInit
//
//=========================================================================
VOID DiagIoInit(CHAR * pDiagId,BOOL bConsole,BOOL bEvent,UINT uLevel)
{
   if (DIAGNOSTICS)
   {
      InitializeCriticalSection(&csDiagIo);

      uDiagLevel = uLevel;
      bEventLog = bEvent;
      bConsoleLog = bConsole;
      pEventHost = (CHAR *) malloc(10);
      strcpy(pEventHost,"");  // local host
      pDiagHdr = (CHAR *) malloc(strlen(pDiagId) + 1);
      strcpy(pDiagHdr,pDiagId);
      if (bEventLog)
      {
         hEventLog = RegisterEventSource(pEventHost,pDiagId);
         if (hEventLog == NULL)
         {
            bEventLog = FALSE;
            if (bConsoleLog)
               fprintf(stdout,
                  "%s: Event Log Register Failed (%ld)\n"
                  "Event Log Will NOT be Used\n",
                  pDiagHdr,GetLastError());
         }
         else
         {
            if (bConsoleLog)
               fprintf(stdout,"%s: Event Logging to LocalHost as %s\n",
                  pDiagHdr,pDiagHdr);
         };
      };   // if bEventLog
   };   // if Diagnostics
};   // DiagIoInit


//=========================================================================
//
// Function name: DiagIoTerm
//
//=========================================================================
VOID DiagIoTerm(VOID)
```

```
{
   if (DIAGNOSTICS)
   {
      DeleteCriticalSection(&csDiagIo);
      if (hEventLog != NULL)
         DeregisterEventSource(hEventLog);
      free(pDiagHdr);
      free(pEventHost);
   };
};   // DiagIoTerm

//========================================================================
//
// Function name: DiagIoWrite
//
//========================================================================
VOID DiagIoWrite(CHAR * pDiagBuffer, UINT uSeverity)
{
   CHAR * pDMsgs[3];
   UINT uMsgCnt = 0;
   INT iERslt = 0;
   if (DIAGNOSTICS)
   {
      if (uDiagLevel >= uSeverity)
      {
         EnterCriticalSection(&csDiagIo);
         __try
         {
            if (uSeverity == DIAG_ERROR)
            {
               pDMsgs[0] = pDiagHdr;
               pDMsgs[1] = pErrHdr;
               pDMsgs[2] = pDiagBuffer;
               uMsgCnt = 3;
            }
            else
            {
               pDMsgs[0] = pDiagHdr;
               pDMsgs[1] = pDiagBuffer;
               uMsgCnt = 2;
            };
            if (bEventLog)
               iERslt = WriteEventLog(pDMsgs,uMsgCnt,uSeverity);
            if (bConsoleLog)
            {
               if (uMsgCnt == 3)
                  fprintf(stdout,"\n%s:
%s\n%s",pDMsgs[0],pDMsgs[1],pDMsgs[2]);
               else
                  fprintf(stdout,"\n%s: %s",pDMsgs[0],pDMsgs[1]);
               if (iERslt != 0)
                  fprintf(stdout,
                     "EventLog Write Failed (%ld), No Longer in Use\n",
                     iERslt);
            };
         }
         __finally
         {
            LeaveCriticalSection(&csDiagIo);
         };
      };   // if uDiagLevel >= uSeverity
   };   // if Diagnostics
};   // DiagIoWrite

INT WriteEventLog(CHAR * pDMsgs[],UINT uMsgCnt,UINT uSeverity)
{
   WORD wType;
   WORD wCount;
   wCount = uMsgCnt;
   switch (uSeverity)
   {
      case DIAG_ERROR:
         wType = EVENTLOG_ERROR_TYPE;
         break;
      default:
         wType = EVENTLOG_INFORMATION_TYPE;
         break;
   };
   if (wType != 0)
   {
      if (!ReportEvent(hEventLog,           // event log handle
                       wType,               // event type
                       0,                   // category zero
                       uSeverity,           // no event identifier
                       NULL,                // no user security identifier
                       wCount,              // # of substitution strings
                       0,                   // no binary data
                       (LPCTSTR *) pDMsgs,  // address of string array
                       NULL))               // address of binary
      {
         DeregisterEventSource(hEventLog);
         hEventLog = NULL;
         bEventLog = FALSE;
         return(GetLastError());
      };   // ReportEvent failed
   };   // if wType != 0
   return(0);
};   // WriteEventLog
```

SERVER MAKEFILES

```
SVR = tpccsvr
SRC = \webrte\tpcctux\tpccsvr.c
DBG = /f "/Zi"
$(SVR).exe: $(SRC)
   erase $(SVR).exe
   $(TUXDIR)\bin\buildserver /f "$(SRC)" /o $(SVR).exe /s
NEWORDER:NEWORDER /s PAYMENT:PAYMENT /s ORDERSTS:ORDERSTS /s
STOCKLVL:STOCKLVL -l i:\mssql7\devtools\lib\ntwdblib.lib
   copy $(SVR).exe $(APPDIR)

SVR = tpccdelv
SRC = \webrte\tpcctux\tpccdelv.c
DBG = /f "/Zi"
$(SVR).exe: $(SRC)
   erase $(SVR).exe
   $(TUXDIR)\bin\buildserver /f "$(SRC)" /o $(SVR).exe /s
DELIVERY:DELIVERY  -l i:\mssql7\devtools\lib\ntwdblib.lib
```

```
   copy $(SVR).exe $(APPDIR)
```

tpccsvr.h

```
// tpccsvr.h
//
// Copyright Unisys, 1997
// Copyright Microsoft, 1996

#include "tpcc.h"

#define DEFCLPACKSIZE            2000
#define DEADLOCKWAIT             10
#define LOGFILE_NAME             "delilog"

// String length constants
#define SERVER_NAME_LEN            20
#define DATABASE_NAME_LEN          20
#define USER_NAME_LEN              20
#define PASSWORD_LEN               20
#define TABLE_NAME_LEN             20
```

tpcc.h

```
// tpcc.h

#include <time.h>
#define DBNTWIN32
#include <sqlfront.h>
#include <sqldb.h>

// TPCCHandler return codes
#define TPCCSEND 1
#define TPCCSENDEND 2
#define TPCCENDNOW 3

// TPCC Service return codes
#define SVC_BADITEMID 1
#define SVC_NOERROR 0
#define SVCERR_DEADLOCK -1
#define SVCERR_NOCUSTOMER -2
#define SVCERR_NOORDERS -3
#define SVCERR_DBLIB -4

// Min/Max transaction data definitions
#define MIN_DId 1
#define MAX_DId 10
#define MIN_OL 5
#define MAX_OL 15
#define MIN_QUANTITY 1
#define MAX_QUANTITY 10
#define MIN_ITEM_ID 1
#define MAX_ITEM_ID 100000
#define MIN_CUST_ID 1
#define MAX_CUST_ID 3000
#define MIN_CARRIER 1
#define MAX_CARRIER 10
#define MIN_THRESHOLD 10
#define MAX_THRESHOLD 20

// pTPCC->iStatusId codes
#define INVALID_IID               1
#define STATUS_OK                 0
#define ERR_CMD_UNKNOWN           -10
#define ERRTXT_CMD_UNKNOWN        "Unrecognized Command"
#define ERR_ALREADY_LOGGEDIN      -11
#define ERRTXT_ALREADY_LOGGEDIN   "Already Logged In"
#define ERR_TERMID                -12
#define ERRTXT_TERMID             "TermId or SyncId in Error"
#define ERR_FORM_UNKNOWN          -13
#define ERRTXT_FORM_UNKNOWN       "Unrecognized FormId"
#define ERR_WID_INVALID           -14
#define ERR_DID_INVALID           -15
#define ERR_MISSING_KEY           -16
#define ERR_NOT_NUMERIC           -17
#define ERR_THRESHOLD_RANGE       -18
#define ERR_EMBEDDED_EMPTY_OL     -19
#define ERR_QUANTITY_INVALID      -20
#define ERR_OL_INVALID            -21
#define ERR_OL_COUNT              -22
#define ERR_TM_INTERFACE          -23
#define ERR_SERVICE_RSLT          -24
#define ERR_INPUT_TOOLONG         -25
#define ERR_IDANDNAME_EMPTY       -26
#define ERR_IDANDNAME_ENTERED     -27
#define ERR_AMOUNT_BADFORM        -28
#define ERR_AMOUNT_INVALID        -29
#define ERR_CARRIER_INVALID       -30
#define ERR_TERM_ALLOC            -31

#define STATUS_LEN 200
#define NAME_LEN 16
#define ADDR_LEN 20
#define STATE_LEN 2
#define ZIP_LEN 9

#define MAX_MSG_SZ  5000

typedef struct
{
   short ol_supply_w_id;
   long ol_i_id;
   char ol_i_name[25];
   short ol_quantity;
   char ol_brand_generic[2];
   double ol_i_price;
   double ol_amount;
   short ol_stock;
} OL_NEW_ORDER_DATA;

typedef struct
{
   short w_id;
   short d_id;
   long        c_id;
   short o_ol_cnt;
   char c_last[NAME_LEN + 1];
   char c_credit[3];
   double c_discount;
```

```
   double w_tax;
   double d_tax;
   long o_id;
   short o_commit_flag;
   DBDATEREC o_entry_d;
   short o_all_local;
   double total_amount;
   char execution_status[STATUS_LEN];
   OL_NEW_ORDER_DATA Ol[MAX_OL];
} NEW_ORDER_DATA;

typedef struct
{
   short w_id;
   short d_id;
   long c_id;
   short c_d_id;
   short c_w_id;
   double h_amount;
   DBDATEREC h_date;
   char w_street_1[ADDR_LEN + 1];
   char w_street_2[ADDR_LEN + 1];
   char w_city[ADDR_LEN + 1];
   char w_state[STATE_LEN + 1];
   char w_zip[ZIP_LEN + 1];
   char d_street_1[ADDR_LEN + 1];
   char d_street_2[ADDR_LEN + 1];
   char d_city[ADDR_LEN + 1];
   char d_state[STATE_LEN + 1];
   char d_zip[ZIP_LEN + 1];
   char c_first[NAME_LEN + 1];
   char c_middle[3];
   char c_last[NAME_LEN + 1];
   char c_street_1[ADDR_LEN + 1];
   char c_street_2[ADDR_LEN + 1];
   char c_city[ADDR_LEN + 1];
   char c_state[STATE_LEN + 1];
   char c_zip[ZIP_LEN + 1];
   char c_phone[16];
   DBDATEREC c_since;
   char c_credit[3];
   double c_credit_lim;
   double c_discount;
   double c_balance;
   char c_data[200+1];
   char execution_status[STATUS_LEN];
} PAYMENT_DATA;

typedef struct
{
   long ol_i_id;
   short ol_supply_w_id;
   short ol_quantity;
   double ol_amount;
   DBDATEREC ol_delivery_d;
} OL_ORDER_STATUS_DATA;

typedef struct
{
   short w_id;
   short d_id;
   long c_id;
   char c_first[NAME_LEN + 1];
   char c_middle[3];
   char c_last[NAME_LEN + 1];
   double c_balance;
   long o_id;
   DBDATEREC o_entry_d;
   short o_carrier_id;
   OL_ORDER_STATUS_DATA OlOrderStatusData[MAX_OL];
   short o_ol_cnt;
   char execution_status[STATUS_LEN];
} ORDER_STATUS_DATA;

typedef struct
{
   short w_id;
   short o_carrier_id;
   long o_id[10];
   int iComplete;
   SYSTEMTIME QTime;                // time delivery was queued
   SYSTEMTIME EndTime;              // time delivery completed
   char execution_status[STATUS_LEN];
} DELIVERY_DATA;

typedef struct
{
   short w_id;
   short d_id;
   short thresh_hold;
   long low_stock;
   char execution_status[STATUS_LEN];
} STOCK_LEVEL_DATA;
```

tpccsvr.c

```
// tpcctux.c
//
// Copyright Unisys, 1997
// Copyright Microsoft, 1996

#include <windows.h>
#include <malloc.h>
#include <stdarg.h>
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <time.h>
#include <sys\timeb.h>

#include <atmi.h>
#include <userlog.h>

#include "tpccsvr.h"

char   szServer[32]   = "tpccserver";
char   szUser[32]            = { 0 };
char   szPassword[32] = { 0 };
char   szDatabase[32] = "tpcc";
char  szService[16]  = "tpccsvr";
char  szWork[200];
```

```
PDBPROCESS     dbproc;
int     spid;                                   // spid assigned from dblib
BOOL  bFailed;
BOOL  bDeadlock;
short   DeadlockRetry  = (short)3;

int err_handler(DBPROCESS *dbproc, int severity, int dberr, int oserr,
char *dberrstr, char *oserrstr);
int msg_handler(DBPROCESS *dbproc, DBINT msgno, int msgstate, int
severity, char *msgtext);
int SQLStockLevel(STOCK_LEVEL_DATA *psld);
int SQLNewOrder(NEW_ORDER_DATA * pnod);
int SQLPayment(PAYMENT_DATA *ppd);
int SQLOrderStatus(ORDER_STATUS_DATA * pOrderStatus);
void UtilStrCpy(char * pDest, char * pSrc, int n);
VOID GetArgs(INT argc, CHAR **argv);

//============================================================================
//
// Function name: tpsvrinit
//
//============================================================================
tpsvrinit(int argc, char *argv[])
{
   GetArgs(argc,argv);
   sprintf(szWork,"%s Started, DBServer=%s,DB=%s",
      szService,szServer,szDatabase);
   userlog(szWork);
   if (SQLInit(szServer,szDatabase,szUser,szPassword))
      return(-1);
   userlog("Database open, initialization complete");
   return(0);
};   // tpsvrinit

//============================================================================
//
// Function name: tpsvrdone
//
//============================================================================
void tpsvrdone()
{
   userlog("Shutdown request for tpcctux server");
   dbclose(dbproc);
   dbexit();
};   // tpsvrdone

//============================================================================
//
// Function name: NEWORDER
//
//    Entry point called by tuxedo for NEWORDER service requests.
//
//============================================================================
void NEWORDER(TPSVCINFO * svcinfo)
{
   int iRslt;
   NEW_ORDER_DATA * pnod;

   pnod = (NEW_ORDER_DATA *) svcinfo->data;
   iRslt = SQLNewOrder(pnod);

   // Check for DBLib termination error
   if (bFailed)
   {
      strcpy(pnod->execution_status,szWork);
      tpreturn(TPFAIL,SVCERR_DBLIB,svcinfo->data,svcinfo->len,0);
   }
   else
   if (iRslt == 0)
      tpreturn(TPSUCCESS,0,svcinfo->data,svcinfo->len,0);
   else
      tpreturn(TPFAIL,iRslt,svcinfo->data,svcinfo->len,0);
};   // NEWORDER

//============================================================================
//
// Function name: PAYMENT
//
//    Entry point called by tuxedo for PAYMENT service requests.
//
//============================================================================
void PAYMENT(TPSVCINFO * svcinfo)
{
   int iRslt;
   PAYMENT_DATA * ppd;

   ppd = (PAYMENT_DATA *) svcinfo->data;

   iRslt = SQLPayment(ppd);

   if (bFailed)
   {
      strcpy(ppd->execution_status,szWork);
      tpreturn(TPFAIL,SVCERR_DBLIB,svcinfo->data,svcinfo->len,0);
   }
   else
   if (iRslt == 0)
      tpreturn(TPSUCCESS,0,svcinfo->data,svcinfo->len,0);
   else
      tpreturn(TPFAIL,iRslt,svcinfo->data,svcinfo->len,0);
};   // PAYMENT

//============================================================================
//
// Function name: ORDERSTS
//
//    Entry point called by tuxedo for ORDERSTS service requests.
//
//============================================================================
void ORDERSTS(TPSVCINFO * svcinfo)
{
   int iRslt;
   ORDER_STATUS_DATA * posd;

   posd = (ORDER_STATUS_DATA *) svcinfo->data;
   iRslt = SQLOrderStatus(posd);

   // Check for DBLib termination error
   if (bFailed)
   {
      strcpy(posd->execution_status,szWork);
      tpreturn(TPFAIL,SVCERR_DBLIB,svcinfo->data,svcinfo->len,0);
```

```
   }
   else
   if (iRslt == 0)
      tpreturn(TPSUCCESS,0,svcinfo->data,svcinfo->len,0);
   else
      tpreturn(TPFAIL,iRslt,svcinfo->data,svcinfo->len,0);
};   // ORDERSTS

//==============================================================================
//
// Function name: STOCKLVL
//
//    Entry point called by tuxedo for STOCKLVL service requests.
//
//==============================================================================
void STOCKLVL(TPSVCINFO * svcinfo)
{
   int iRslt;
   STOCK_LEVEL_DATA * psld;

   psld = (STOCK_LEVEL_DATA *) svcinfo->data;
   iRslt = SQLStockLevel(psld);

   // Check for DBLib termination error
   if (bFailed)
   {
      strcpy(psld->execution_status,szWork);
      tpreturn(TPFAIL,SVCERR_DBLIB,svcinfo->data,svcinfo->len,0);
   }
   else
   if (iRslt == 0)
      tpreturn(TPSUCCESS,0,svcinfo->data,svcinfo->len,0);
   else
      tpreturn(TPFAIL,iRslt,svcinfo->data,svcinfo->len,0);

};   // STOCKLVL

//==============================================================================
//
// Function name: SQLInit
//
//    Set global dbproc and spid.
//
//    Result:
//       FALSE - database open, dbproc valid
//       TRUE - database open failed
//
//==============================================================================
BOOL SQLInit(CHAR * pSvr,CHAR * pDB,CHAR * pUsr,CHAR * pPW,CHAR * pSvc)
{
   char szApp[32];
   char server[256];
   char database[256];
   char user[256];
   char password[256];
   LOGINREC    *login;

   dbinit();
   // install error and message handlers
   dbmsghandle((DBMSGHANDLE_PROC)msg_handler);
   dberrhandle((DBERRHANDLE_PROC)err_handler);

   dbproc = NULL;
   strcpy(server,pSvr);
   strcpy(database,pDB);
   strcpy(user,pUsr);
   strcpy(password,pPW);
   sprintf(szApp,"%s%ld",pSvc,_getpid());

   login = dblogin();
   if (!*user )
      DBSETLUSER(login,"sa");
   else
      DBSETLUSER(login,user);
   DBSETLPWD(login,password);
   DBSETLHOST(login,szApp);
   DBSETLVERSION(login, DBVER60);
// DBSETLPACKET(login,(unsigned short)DEFCLPACKSIZE);

   if ((dbproc = dbopen(login,server)) == NULL)
   {
      userlog("dbopen failed");
      return TRUE;
   };
   // Use the the right database
   dbuse(dbproc,database);
   dbcmd(dbproc,"select @@spid");
   dbsqlexec(dbproc);
   while (dbresults(dbproc) != NO_MORE_RESULTS)
   {
      dbbind(dbproc,1,SMALLBIND,(DBINT) 0,(BYTE *) spid);
      while (dbnextrow(dbproc) != NO_MORE_ROWS)
         ;
   };

   dbcmd(dbproc,"set nocount on");
   dbsqlexec(dbproc);
   while (dbresults(dbproc) != NO_MORE_RESULTS)
   {
      while (dbnextrow(dbproc) != NO_MORE_ROWS)
         ;
   };

   //rollback transaction on abort
   dbcmd(dbproc,"set XACT_ABORT ON");
   dbsqlexec(dbproc);
   while (dbresults(dbproc) != NO_MORE_RESULTS)
   {
      while (dbnextrow(dbproc) != NO_MORE_ROWS)
         ;
   };

   return(FALSE);

};   // SQLInit

//==============================================================================
// FUNCTION: err_handler
//
//    Handles DB-Library errors
//
// ARGUMENTS:
```

```
//    DBPROCESS   *dbproc     DBPROCESS id pointer
//    int         severity    severity of error
//    int         dberr       error id
//    int         oserr       operating system specific error code
//    char        *dberrstr   printable error description of dberr
//    char        *oserrstr   printable error description of oserr
//
// RETURNS:
//    int      INT_CANCEL
//
// COMMENTS:   None
//
//=============================================================================
int err_handler(DBPROCESS *dbproc, int severity, int dberr, int oserr,
char *dberrstr, char *oserrstr)
{
   if ((dbproc == NULL) || (DBDEAD(dbproc)))
   {
      userlog("ErrHandler: DBPROC is invalid");
      return INT_CANCEL;
   };
   if (bFailed)
      return INT_CANCEL;
   if (oserr != DBNOERR)
   {
      sprintf(szWork,"ErrHandler: OSErr(%ld) - %s",oserr,oserrstr);
      userlog(szWork);
      bFailed = TRUE;
   };

   return INT_CANCEL;

};   // err_handler

//=============================================================================
// FUNCTION: msg_handler
//
//    Handles DB-Library SQL Server error messages
//
// ARGUMENTS:
//    DBPROCESS   *dbproc     DBPROCESS id pointer
//    DBINT       msgno       message number
//    int         msgstate    message state
//    int         severity    message severity
//    char        *msgtext    printable message description
//
// RETURNS:    int   INT_CONTINUE   continue operation
//                   INT_CANCEL      cancel operation
//
// COMMENTS:   This function also sets the dead lock dbproc
//             variable if necessary.
//
//=============================================================================
int msg_handler(DBPROCESS *dbproc, DBINT msgno, int msgstate, int
severity, char *msgtext)
{

   if ((msgno == 5701) || (msgno == 2528) ||
       (msgno == 5703) || (msgno == 6006))
      return INT_CONTINUE;

   // deadlock message
   if (msgno == 1205)
   {
      // set the deadlock indicator
      bDeadlock = TRUE;
      return INT_CONTINUE;
   };

   if (bFailed)
      return INT_CANCEL;

   if (msgno == 0)
      return INT_CONTINUE;
   else
   {
      sprintf(szWork,"MsgHandler: MsgNo(%ld) - %s",msgno,msgtext);
      userlog(szWork);
      bFailed = TRUE;
   };

   return INT_CANCEL;

};   // msg_handler

//=============================================================================
// FUNCTION: SQLStockLevel
//
//    Handles the stock level transaction.
//
// ARGUMENTS:
//    STOCK_LEVEL_DATA  StockLevel input / output data structure
//    dbdata (global)
//    bDeadlock (global)
//
// RETURNS:
//    SVC_NOERROR  success
//    !SVC_NOERROR failure
//
// COMMENTS:   None
//
//=============================================================================
int SQLStockLevel(STOCK_LEVEL_DATA * psld)
{
   int tryit;
   short num_deadlocks = 0;
   RETCODE rc;
   BYTE * pData;

   bFailed = FALSE;
   bDeadlock = FALSE;

   for (tryit=0; tryit < DeadlockRetry; tryit++)
   {
      if (dbrpcinit(dbproc,"tpcc_stocklevel",0) == SUCCEED)
      {
         dbrpcparam(dbproc, NULL, 0, SQLINT2, -1, -1,
            (BYTE *) &psld->w_id);
         dbrpcparam(dbproc, NULL, 0, SQLINT1, -1, -1,
            (BYTE *) &psld->d_id);
         dbrpcparam(dbproc, NULL, 0, SQLINT2, -1, -1,
            (BYTE *) &psld->thresh_hold);
```

```
         if (dbrpcexec(dbproc) == SUCCEED)
         {
            while (((rc = dbresults(dbproc)) != NO_MORE_RESULTS) &&
                   (rc != FAIL))
            {
               if (DBROWS(dbproc))
               {
                  while (((rc = dbnextrow(dbproc)) != NO_MORE_ROWS) &&
                         (rc != FAIL))
                  {
                     if(pData=dbdata(dbproc,1))
                        psld->low_stock = *((long *) pData);
                  };
               };   // if (DBROWS(dbproc)
            };   // while (dbresults)
         };   // if (dbrpcexec)
      };   // if (dbrpcinit)
      if (bDeadlock)
      {
         num_deadlocks++;
         bDeadlock = FALSE;
         userlog("StockLevel Deadlock Retry (%d)",num_deadlocks);
         Sleep(10 * tryit);
      }
      else
      {
         strcpy(psld->execution_status,"Transaction commited.");
         return(SVC_NOERROR);
      };
   };  // for (tryit)

   // If we reached here, it means we quit after MAX_RETRY deadlocks
   strcpy(psld->execution_status,"Hit deadlock max.");
   userlog("StockLevel Deadlock Failure (%d)",num_deadlocks);
        return(SVCERR_DEADLOCK);

};   // SQLStockLevel

//================================================================================
// FUNCTION: SQLNewOrder
//
//    Handles the new order transaction.
//
// ARGUMENTS:
//    NEW_ORDER_DATA    NewOrder structure for input/output data
//    dbdata (global)
//    bDeadlock (global)
//
// RETURNS:
//    SVC_NOERROR  success
//    !SVC_NOERROR failure
//
// COMMENTS:   None
//
//================================================================================
int SQLNewOrder(NEW_ORDER_DATA * pnod)
{
   RETCODE rc;
   int i;
   DBINT commit_flag;
   short num_deadlocks = 0;
   int tryit;
   DBDATETIME datetime;
   BYTE * pData;

   bFailed = FALSE;
   bDeadlock = FALSE;

   for (tryit=0; tryit < DeadlockRetry; tryit++)
   {
      if (dbrpcinit(dbproc,"tpcc_neworder",0) == SUCCEED)
      {
         dbrpcparam(dbproc, NULL, 0, SQLINT2, -1, -1,
            (BYTE *) &pnod->w_id);
         dbrpcparam(dbproc, NULL, 0, SQLINT1, -1, -1,
            (BYTE *) &pnod->d_id);
         dbrpcparam(dbproc, NULL, 0, SQLINT4, -1, -1,
            (BYTE *) &pnod->c_id);
         dbrpcparam(dbproc, NULL, 0, SQLINT1, -1, -1,
            (BYTE *) &pnod->o_ol_cnt);

         pnod->o_all_local = 1;
         for (i = 0; i < pnod->o_ol_cnt; i++)
         {
            if (pnod->o_all_local &&
                pnod->Ol[i].ol_supply_w_id != pnod->w_id )
               pnod->o_all_local = 0;
         };
         dbrpcparam(dbproc, NULL, 0, SQLINT1, -1, -1,
            (BYTE *) &pnod->o_all_local);

         for (i = 0; i < pnod->o_ol_cnt; i++)
         {
            dbrpcparam(dbproc, NULL, 0, SQLINT4, -1, -1,
               (BYTE *) &pnod->Ol[i].ol_i_id);
            dbrpcparam(dbproc, NULL, 0, SQLINT2, -1, -1,
               (BYTE *) &pnod->Ol[i].ol_supply_w_id);
            dbrpcparam(dbproc, NULL, 0, SQLINT2, -1, -1,
               (BYTE *) &pnod->Ol[i].ol_quantity);
         };

         if (dbrpcexec(dbproc) == SUCCEED)
         {
            pnod->total_amount=0;
            // Get results from order line
            for (i = 0; i<pnod->o_ol_cnt; i++)
            {
               if (((rc = dbresults(dbproc)) != NO_MORE_RESULTS) &&
                    (rc != FAIL))
               {
                  if (DBROWS(dbproc) && (dbnumcols(dbproc) == 5))
                  {
                     while (dbnextrow(dbproc) != NO_MORE_ROWS)
                     {
                        if(pData=dbdata(dbproc, 1))
                           UtilStrCpy(pnod-
>Ol[i].ol_i_name,pData,dbdatlen(dbproc, 1));
                        if(pData=dbdata(dbproc, 2))
                           pnod->Ol[i].ol_stock = (*(DBSMALLINT *) pData);
                        if(pData=dbdata(dbproc, 3))
```

```
                        UtilStrCpy(pnod-
>Ol[i].ol_brand_generic,pData,dbdatlen(dbproc, 3));
                     if(pData=dbdata(dbproc, 4))

dbconvert(dbproc,SQLNUMERIC,pData,sizeof(DBNUMERIC),
                           SQLFLTN,(CHAR *) &pnod->Ol[i].ol_i_price,8);
                     if(pData=dbdata(dbproc, 5))

dbconvert(dbproc,SQLNUMERIC,pData,sizeof(DBNUMERIC),
                           SQLFLTN,(CHAR *) &pnod->Ol[i].ol_amount,8);
                      pnod->total_amount = pnod->total_amount + pnod-
>Ol[i].ol_amount;
                  };   // while (dbnextrow)
               };   // if (DBROWS && dbnumcols)
            };   // if (dbresults)
         };   // for (o_ol_cnt)
         while (((rc = dbresults(dbproc)) != NO_MORE_RESULTS) &&
                (rc != FAIL))
         {
            if (DBROWS(dbproc) && (dbnumcols(dbproc) == 8))
            {
               while (((rc = dbnextrow(dbproc)) != NO_MORE_ROWS) &&
                      (rc != FAIL))
               {
                  if(pData=dbdata(dbproc, 1))
                  dbconvert(dbproc,SQLNUMERIC,pData,sizeof(DBNUMERIC),
                     SQLFLTN,(CHAR *) &pnod->w_tax,8);
                  if(pData=dbdata(dbproc, 2))
                  dbconvert(dbproc,SQLNUMERIC,pData,sizeof(DBNUMERIC),
                     SQLFLTN,(CHAR *) &pnod->d_tax,8);
                  if(pData=dbdata(dbproc, 3))
                     pnod->o_id = (*(DBINT *) pData);
                  if(pData=dbdata(dbproc, 4))
                     UtilStrCpy(pnod->c_last,pData,dbdatlen(dbproc,4));
                  if(pData=dbdata(dbproc, 5))
                  dbconvert(dbproc,SQLNUMERIC,pData,sizeof(DBNUMERIC),
                     SQLFLTN,(CHAR *) &pnod->c_discount,8);
                  if(pData=dbdata(dbproc, 6))
                     UtilStrCpy(pnod-
>c_credit,pData,dbdatlen(dbproc,6));
                  if(pData=dbdata(dbproc, 7))
                  {
                     datetime = *((DBDATETIME *) pData);
                     dbdatecrack(dbproc,&pnod->o_entry_d,&datetime);
                  };
                  if(pData=dbdata(dbproc, 8))
                     commit_flag = (*(DBTINYINT *) pData);
               };   // while (dbnextrow)
            };   // if (DBROWS && dbnumcols)
         };   // while (dbresults)
      };   // if (dbrpcexec)
   };   // if (dbrpcinit)
   if (bDeadlock)
   {
      num_deadlocks++;
      bDeadlock = FALSE;
      userlog("NewOrder Deadlock Retry (%d)",num_deadlocks);
      Sleep(10 * tryit);
   }
   else
   {
      if (commit_flag == 1)
      {
         pnod->total_amount = pnod->total_amount *
            ((1 + pnod->w_tax + pnod->d_tax) * (1 - pnod->c_discount));
         strcpy(pnod->execution_status,"Transaction commited.");
         return(SVC_NOERROR);
      }
      else
      {
         strcpy(pnod->execution_status,"Item number is not valid.");
         return(SVC_BADITEMID);
      };
   };   // !bDeadlock
};   // for (tryit)

// If we reached here, it means we quit after MAX_RETRY deadlocks
strcpy(pnod->execution_status,"Hit deadlock max.");
userlog("NewOrder Deadlock Failure (%d)",num_deadlocks);
return(SVCERR_DEADLOCK);

};   // SQLNewOrder

//============================================================================
// FUNCTION: SQLPayment
//
//    Handles the payment transaction.
//
// ARGUMENTS:
//    PAYMENT_DATA      Payment input/output data structure
//    dbdata (global)
//    bDeadlock (global)
//
// RETURNS:
//    SVC_NOERROR  success
//    !SVC_NOERROR failure
//
// COMMENTS:   None
//
//============================================================================
int SQLPayment(PAYMENT_DATA *ppd)
{
   RETCODE rc;
   int tryit;
   short num_deadlocks = 0;
   DBDATETIME datetime;
   BYTE * pData;

   bFailed = FALSE;
   bDeadlock = FALSE;

   for (tryit=0; tryit < DeadlockRetry; tryit++)
   {
      if (dbrpcinit(dbproc,"tpcc_payment",0) == SUCCEED)
      {
         dbrpcparam(dbproc,NULL,0,SQLINT2,-1,-1,(BYTE *) &ppd->w_id);
         dbrpcparam(dbproc,NULL,0,SQLINT2,-1,-1,(BYTE *) &ppd->c_w_id);
         dbrpcparam(dbproc,NULL,0,SQLFLT8,-1,-1,(BYTE *) &ppd->h_amount);
         dbrpcparam(dbproc,NULL,0,SQLINT1,-1,-1,(BYTE *) &ppd->d_id);
         dbrpcparam(dbproc,NULL,0,SQLINT1,-1,-1,(BYTE *) &ppd->c_d_id);
         dbrpcparam(dbproc,NULL,0,SQLINT4,-1,-1,(BYTE *) &ppd->c_id);
         if (ppd->c_id == 0)
```

```
         {
            dbrpcparam(dbproc,NULL,0,SQLCHAR,-1,strlen(ppd->c_last),ppd-
>c_last);
         };
      };
      if (dbrpcexec(dbproc) == SUCCEED)
      {
         while (((rc = dbresults(dbproc)) != NO_MORE_RESULTS) && (rc !=
FAIL))
         {
            if (DBROWS(dbproc) && (dbnumcols(dbproc) == 27))
            {
               while (((rc = dbnextrow(dbproc)) != NO_MORE_ROWS) && (rc !=
FAIL))
               {
                  if(pData=dbdata(dbproc,1))
                     ppd->c_id = *((DBINT *) pData);
                  if(pData=dbdata(dbproc,2))
                     UtilStrCpy(ppd->c_last,pData,dbdatlen(dbproc,2));
                  if(pData=dbdata(dbproc,3))
                  {
                     datetime = *((DBDATETIME *) pData);
                     dbdatecrack(dbproc,&ppd->h_date,&datetime);
                  };
                  if(pData=dbdata(dbproc,4))
                     UtilStrCpy(ppd->w_street_1,pData,dbdatlen(dbproc,4));
                  if(pData=dbdata(dbproc,5))
                     UtilStrCpy(ppd->w_street_2,pData,dbdatlen(dbproc,5));
                  if(pData=dbdata(dbproc,6))
                     UtilStrCpy(ppd->w_city,pData,dbdatlen(dbproc,6));
                  if(pData=dbdata(dbproc,7))
                     UtilStrCpy(ppd->w_state,pData,dbdatlen(dbproc,7));
                  if(pData=dbdata(dbproc,8))
                     UtilStrCpy(ppd->w_zip,pData,dbdatlen(dbproc,8));
                  if(pData=dbdata(dbproc,9))
                     UtilStrCpy(ppd->d_street_1,pData,dbdatlen(dbproc,9));
                  if(pData=dbdata(dbproc,10))
                     UtilStrCpy(ppd-
>d_street_2,pData,dbdatlen(dbproc,10));
                  if(pData=dbdata(dbproc,11))
                     UtilStrCpy(ppd->d_city,pData,dbdatlen(dbproc,11));
                  if(pData=dbdata(dbproc,12))
                     UtilStrCpy(ppd->d_state,pData,dbdatlen(dbproc,12));
                  if(pData=dbdata(dbproc,13))
                     UtilStrCpy(ppd->d_zip,pData,dbdatlen(dbproc,13));
                  if(pData=dbdata(dbproc,14))
                     UtilStrCpy(ppd->c_first,pData,dbdatlen(dbproc,14));
                  if(pData=dbdata(dbproc,15))
                     UtilStrCpy(ppd->c_middle,pData,dbdatlen(dbproc,15));
                  if(pData=dbdata(dbproc,16))
                     UtilStrCpy(ppd-
>c_street_1,pData,dbdatlen(dbproc,16));
                  if(pData=dbdata(dbproc,17))
                     UtilStrCpy(ppd-
>c_street_2,pData,dbdatlen(dbproc,17));
                  if(pData=dbdata(dbproc,18))
                     UtilStrCpy(ppd->c_city,pData,dbdatlen(dbproc,18));
                  if(pData=dbdata(dbproc,19))
                     UtilStrCpy(ppd->c_state,pData,dbdatlen(dbproc,19));
                  if(pData=dbdata(dbproc,20))
                     UtilStrCpy(ppd->c_zip,pData,dbdatlen(dbproc,20));
                  if(pData=dbdata(dbproc,21))
                     UtilStrCpy(ppd->c_phone,pData,dbdatlen(dbproc,21));
                  if(pData=dbdata(dbproc,22))
                  {
                     datetime = *((DBDATETIME *) pData);
                     dbdatecrack(dbproc,&ppd->c_since, &datetime);
                  };
                  if(pData=dbdata(dbproc,23))
                     UtilStrCpy(ppd->c_credit,pData,dbdatlen(dbproc,23));
                  if(pData=dbdata(dbproc,24))
                     dbconvert(dbproc,SQLNUMERIC,pData,sizeof(DBNUMERIC),
                        SQLFLTN,(CHAR *) &ppd->c_credit_lim,8);
                  if(pData=dbdata(dbproc,25))
                     dbconvert(dbproc,SQLNUMERIC,pData,sizeof(DBNUMERIC),
                        SQLFLTN,(CHAR *) &ppd->c_discount,8);
                  if(pData=dbdata(dbproc,26))
                     dbconvert(dbproc,SQLNUMERIC,pData,sizeof(DBNUMERIC),
                        SQLFLTN,(CHAR *) &ppd->c_balance,8);
                  if(pData=dbdata(dbproc,27))
                     UtilStrCpy(ppd->c_data,pData,dbdatlen(dbproc,27));
               };   // while (dbnextrow)
            };   // if (DBROWS && dbnumcols)
         };   // while (dbresults)
      };   // if (dbrpcexe)
      if (bDeadlock)
      {
         num_deadlocks++;
         bDeadlock = FALSE;
         userlog("Payment Deadlock Retry (%d)",num_deadlocks);
         Sleep(10 * tryit);
      }
      else
      {
         if (ppd->c_id == 0)
         {
            strcpy(ppd->execution_status,"Invalid Customer id,name.");
                              return(SVCERR_NOCUSTOMER);
         }
         else
            strcpy(ppd->execution_status,"Transaction commited.");
         return(SVC_NOERROR);
      };   // !bDeadlock
   };   // for (tryit)

   // If we reached here, it means we quit after MAX_RETRY deadlocks
   strcpy(ppd->execution_status,"Hit deadlock max.");
   userlog("Payment Deadlock Failure (%d)",num_deadlocks);
   return(SVCERR_DEADLOCK);

};   // SQLPayment

//================================================================
// FUNCTION: SQLOrderStatus
//
//    Handles the Order Status transaction.
//
// ARGUMENTS:
//    ORDER_STATUS_DATA      Payment input/output data structure
//    dbdata (global)
//    bDeadlock (global)
//
```

```
// RETURNS:
//    SVC_NOERROR  success
//    !SVC_NOERROR failure
//
// COMMENTS:   None
//
//=============================================================================
int SQLOrderStatus(ORDER_STATUS_DATA * posd)
{
   RETCODE rc;
   int tryit;
   short num_deadlocks = 0;
   int i;
   DBDATETIME datetime;
   BYTE * pData;

   bFailed = FALSE;
   bDeadlock = FALSE;

   for (tryit=0; tryit < DeadlockRetry; tryit++)
   {
      if (dbrpcinit(dbproc,"tpcc_orderstatus", 0) == SUCCEED)
      {
         dbrpcparam(dbproc,NULL,0,SQLINT2,-1,-1,(BYTE *) &posd->w_id);
         dbrpcparam(dbproc,NULL,0,SQLINT1,-1,-1,(BYTE *) &posd->d_id);
         dbrpcparam(dbproc,NULL,0,SQLINT4,-1,-1,(BYTE *) &posd->c_id);
         if (posd->c_id == 0)
         {
            dbrpcparam(dbproc,NULL,0,SQLCHAR,-1,strlen(posd->c_last),posd-
>c_last);
         };
      };
      if (dbrpcexec(dbproc) == SUCCEED)
      {
         while (((rc = dbresults(dbproc)) != NO_MORE_RESULTS) && (rc !=
FAIL))
         {
            if (DBROWS(dbproc) && (dbnumcols(dbproc) == 5))
            {
               i = 0;
               while (((rc = dbnextrow(dbproc)) != NO_MORE_ROWS) && (rc !=
FAIL))
               {
                  if(pData=dbdata(dbproc,1))
                     posd->OlOrderStatusData[i].ol_supply_w_id =
(*(DBSMALLINT *) pData);
                  if(pData=dbdata(dbproc,2))
                     posd->OlOrderStatusData[i].ol_i_id = (*(DBINT *)
pData);
                  if(pData=dbdata(dbproc,3))
                     posd->OlOrderStatusData[i].ol_quantity =
(*(DBSMALLINT *) pData);
                  if(pData=dbdata(dbproc,4))
                     dbconvert(dbproc,SQLNUMERIC,pData,sizeof(DBNUMERIC),
                        SQLFLTN,(CHAR *) &posd-
>OlOrderStatusData[i].ol_amount,8);
                  if(pData=dbdata(dbproc,5))
                  {
                     datetime = *((DBDATETIME *) pData);
                     dbdatecrack(dbproc,&posd-
>OlOrderStatusData[i].ol_delivery_d,&datetime);
                  };
                  i++;
               };   // while (dbnextrow)
               posd->o_ol_cnt = i;
            }   // if (DBROWS && dbnumcols == 5)
            else
            if (DBROWS(dbproc) && (dbnumcols(dbproc) == 8))
            {
               while (((rc = dbnextrow(dbproc)) != NO_MORE_ROWS) && (rc !=
FAIL))
               {
                  if(pData=dbdata(dbproc,1))
                     posd->c_id = (*(DBINT *) pData);
                  if(pData=dbdata(dbproc,2))
                     UtilStrCpy(posd->c_last,pData,dbdatlen(dbproc,2));
                  if(pData=dbdata(dbproc,3))
                     UtilStrCpy(posd->c_first,pData,dbdatlen(dbproc,3));
                  if(pData=dbdata(dbproc,4))
                     UtilStrCpy(posd->c_middle,pData,dbdatlen(dbproc,4));
                  if(pData=dbdata(dbproc,5))
                  {
                     datetime = *((DBDATETIME *) pData);
                     dbdatecrack(dbproc,&posd->o_entry_d,&datetime);
                  };
                  if(pData=dbdata(dbproc,6))
                     posd->o_carrier_id = (*(DBSMALLINT *) pData);
                  if(pData=dbdata(dbproc,7))
                     dbconvert(dbproc,SQLNUMERIC,pData,sizeof(DBNUMERIC),
                        SQLFLTN,(CHAR *) &posd->c_balance,8);
                  if(pData=dbdata(dbproc,8))
                     posd->o_id = (*(DBINT *) pData);
               };   // while (dbnextrow)
            };   // if (DBROWS && dbnumcols == 8)
            if (i==0)
               return(SVCERR_NOORDERS); //"No orders found for customer"
         };   // while (dbresults)
      };   // if (dbrpcexec)
      if (bDeadlock)
      {
         num_deadlocks++;
         bDeadlock = FALSE;
         userlog("OrderStatus Deadlock Retry (%d)",num_deadlocks);
         Sleep(10 * tryit);
      }
      else
      {
         if (posd->c_id == 0 && posd->c_last[0] == 0)
         {
            strcpy(posd->execution_status,"Invalid Customer id,name.");
            return(SVCERR_NOCUSTOMER);
         }
         else
            strcpy(posd->execution_status,"Transaction commited.");
         return(SVC_NOERROR);
      };  // !bDeadlock
   };   // for (tryit)

   // If we reached here, it means we quit after MAX_RETRY deadlocks
   strcpy(posd->execution_status,"Hit deadlock max.");
   userlog("OrderStatus Deadlock Failure (%d)",num_deadlocks);
   return(SVCERR_DEADLOCK);
```

```
};   // SQLOrderStatus

//==============================================================================
// FUNCTION: UtilStrCpy
//
//    Copies n characters from string pSrc to pDst and places a null
//    null character at the end of the destination string.  Unlike
//    strncpy this function ensures that the result string is always
//    null terminated.
//
//==============================================================================
void UtilStrCpy(char * pDest, char * pSrc, int n)
{
   strncpy(pDest, pSrc, n);
   pDest[n] = '\0';
   return;
};   // UtilStrCpy

//==============================================================================
//
// Function name: GetArgs
//
//==============================================================================
VOID GetArgs(INT argc, CHAR **argv)
{
   INT j;
   CHAR * ptr;
   BOOL bRslt = TRUE;

   for (j = 1; j < argc; ++j)
   {
      ptr = argv[j];
      switch (ptr[1])
      {
         case 's':
         case 'S':
            strcpy(szServer,ptr+2);
            break;

         case 'd':
         case 'D':
            strcpy(szDatabase,ptr+2);
            break;

      };   // switch(ptr[1])
   };   // for (j = 1; j < argc; ++j)
};   // GetArgs
```

tpccdelv.c

```
// tpccdelv.// tpccdelv.c
//
// Copyright Unisys, 1997
// Copyright Microsoft, 1996

#include <windows.h>
#include <malloc.h>
#include <stdarg.h>
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <time.h>
#include <sys\timeb.h>

#include <atmi.h>
#include <userlog.h>

#include "tpccsvr.h"

int   iServerNo = 0;
char    szServer[32]   = "tpccdelv";
char    szUser[32]             = { 0 };
char    szPassword[32] = { 0 };
char    szDatabase[32] = "tpcc";
char  szService[16]  = "tpccdelv";
char  szWork[200];

PDBPROCESS     dbproc;
int     spid;                                   // spid assigned from dblib
BOOL  bFailed;
BOOL  bDeadlock;
short   DeadlockRetry  = (short)10;

FILE *fpLog;
char  szLogTitle[32];
BOOL  bFlush = FALSE;               // flush after every write

int err_handler(DBPROCESS *dbproc,int severity,int dberr,int oserr,
                char *dberrstr, char *oserrstr);
int msg_handler(DBPROCESS *dbproc,DBINT msgno,int msgstate,
                int severity,char *msgtext);
void WriteLog(DELIVERY_DATA * pdd);
BOOL OpenLogFile(void);
void CalculateElapsed(int * pElapsed,LPSYSTEMTIME lpBegin,
                      LPSYSTEMTIME lpEnd);
void UtilStrCpy(char * pDest, char * pSrc, int n);
void GetArgs(INT argc, CHAR **argv);

//==============================================================================
//
// Function name: tpsvrinit
//
//==============================================================================
tpsvrinit(int argc, char *argv[])
{
   GetArgs(argc,argv);
   iServerNo = _getpid();
   sprintf(szWork,"%s%ld Started, DBServer=%s, DB=%s",
      szService,iServerNo,szServer,szDatabase);
   userlog(szWork);
   if (OpenLogFile())
      return(-1);
   if (SQLInit(szServer,szDatabase,szUser,szPassword))
      return(-1);
   userlog("Database open, initialization complete");
   return(0);
};   // tpsvrinit

//==============================================================================
//
```

```
// Function name: tpsvrdone
//
//============================================================================
void tpsvrdone()
{
   userlog("Shutdown request for tpccdelv server");
   if ( fpLog )
      fclose(fpLog);
   dbclose(dbproc);
   dbexit();
};   // tpsvrdone

//============================================================================
//
// Function name: DELIVERY
//
//    Entry point called by tuxedo for DELIVERY service requests.
//
//============================================================================
void DELIVERY(TPSVCINFO * svcinfo)
{
   int iRslt;
   DELIVERY_DATA * pdd;

   pdd = (DELIVERY_DATA *) svcinfo->data;
   iRslt = SQLDelivery(pdd);
   WriteLog(pdd);

   // Check for DBLib termination error
   if (bFailed)
   {
      strcpy(pdd->execution_status,szWork);
      userlog(szWork);
      tpreturn(TPFAIL,SVCERR_DBLIB,svcinfo->data,svcinfo->len,0);
   }
   else
   if (iRslt == 0)
      tpreturn(TPSUCCESS,0,svcinfo->data,svcinfo->len,0);
   else
      tpreturn(TPFAIL,iRslt,svcinfo->data,svcinfo->len,0);

};   // DELIVERY

//============================================================================
//
// Function name: SQLInit
//
//    Set global dbproc and spid.
//
//    Result:
//       FALSE - database open, dbproc valid
//       TRUE - database open failed
//
//============================================================================
BOOL SQLInit(CHAR * pSvr,CHAR * pDB,CHAR * pUsr,CHAR * pPW,CHAR * pSvc)
{
   char szApp[32];
   char server[256];
   char database[256];
   char user[256];
   char password[256];
   LOGINREC    *login;

   dbinit();
   // install error and message handlers
   dbmsghandle((DBMSGHANDLE_PROC)msg_handler);
   dberrhandle((DBERRHANDLE_PROC)err_handler);

   dbproc = NULL;
   strcpy(server,pSvr);
   strcpy(database,pDB);
   strcpy(user,pUsr);
   strcpy(password,pPW);
   sprintf(szApp,"%s%ld",pSvc,_getpid());

   login = dblogin();
   if (!*user )
      DBSETLUSER(login,"sa");
   else
      DBSETLUSER(login,user);
   DBSETLPWD(login,password);
   DBSETLHOST(login,szApp);
   DBSETLVERSION(login, DBVER60);
// DBSETLPACKET(login,(unsigned short)DEFCLPACKSIZE);

   if ((dbproc = dbopen(login,server)) == NULL)
   {
      userlog("dbopen failed");
      return TRUE;
   };
   // Use the the right database
   dbuse(dbproc,database);
   dbcmd(dbproc,"select @@spid");
   dbsqlexec(dbproc);
   while (dbresults(dbproc) != NO_MORE_RESULTS)
   {
      dbbind(dbproc,1,SMALLBIND,(DBINT) 0,(BYTE *) spid);
      while (dbnextrow(dbproc) != NO_MORE_ROWS)
         ;
   };

   dbcmd(dbproc,"set nocount on");
   dbsqlexec(dbproc);
   while (dbresults(dbproc) != NO_MORE_RESULTS)
   {
      while (dbnextrow(dbproc) != NO_MORE_ROWS)
         ;
   };

   //rollback transaction on abort
   dbcmd(dbproc,"set XACT_ABORT ON");
   dbsqlexec(dbproc);
   while (dbresults(dbproc) != NO_MORE_RESULTS)
   {
      while (dbnextrow(dbproc) != NO_MORE_ROWS)
         ;
   };

   return(FALSE);

};   // SQLInit
```

```
//==============================================================================
// FUNCTION: err_handler
//
//    Handles DB-Library errors
//
// ARGUMENTS:
//    DBPROCESS   *dbproc     DBPROCESS id pointer
//    int         severity    severity of error
//    int         dberr       error id
//    int         oserr       operating system specific error code
//    char        *dberrstr   printable error description of dberr
//    char        *oserrstr   printable error description of oserr
//
// RETURNS:
//    int      INT_CANCEL
//
// COMMENTS:   None
//
//==============================================================================
int err_handler(DBPROCESS *dbproc, int severity, int dberr, int oserr,
char *dberrstr, char *oserrstr)
{
   if ((dbproc == NULL) || (DBDEAD(dbproc)))
   {
      userlog("ErrHandler: DBPROC is invalid");
      return INT_CANCEL;
   };
   if (bFailed)
      return INT_CANCEL;
   if (oserr != DBNOERR)
   {
      sprintf(szWork,"ErrHandler: OSErr(%ld) - %s",oserr,oserrstr);
      userlog(szWork);
      bFailed = TRUE;
   };

   return INT_CANCEL;

};   // err_handler

//==============================================================================
// FUNCTION: msg_handler
//
//    Handles DB-Library SQL Server error messages
//
// ARGUMENTS:
//    DBPROCESS   *dbproc     DBPROCESS id pointer
//    DBINT       msgno       message number
//    int         msgstate    message state
//    int         severity    message severity
//    char        *msgtext    printable message description
//
// RETURNS:    int   INT_CONTINUE   continue operation
//                   INT_CANCEL      cancel operation
//
// COMMENTS:   This function also sets the dead lock dbproc
//             variable if necessary.
//
//==============================================================================
int msg_handler(DBPROCESS *dbproc, DBINT msgno, int msgstate, int
severity, char *msgtext)
{

   if ((msgno == 5701) || (msgno == 2528) ||
       (msgno == 5703) || (msgno == 6006))
      return INT_CONTINUE;

   // deadlock message
   if (msgno == 1205)
   {
      // set the deadlock indicator
      bDeadlock = TRUE;
      return INT_CONTINUE;
   };

   if (bFailed)
      return INT_CANCEL;

   if (msgno == 0)
      return INT_CONTINUE;
   else
   {
      sprintf(szWork,"MsgHandler: MsgNo(%ld) - %s",msgno,msgtext);
      userlog(szWork);
      bFailed = TRUE;
   };

   return INT_CANCEL;

};   // msg_handler

//==============================================================================
// FUNCTION: SQLDelivery
//
// ARGUMENTS:
//    pdd      delivery transaction structure
//    dbdata (global)
//    bDeadlock (global)
//
// RETURNS:
//    SVC_NOERROR  success
//    !SVC_NOERROR failure
//
// COMMENTS:   None
//
//==============================================================================
int SQLDelivery(DELIVERY_DATA * pdd)
{
   RETCODE rc;
   int i;
   short num_deadlocks = 0;
   int tryit;
   DBDATETIME datetime;
   BYTE * pData;

   bFailed = FALSE;
   bDeadlock = FALSE;
   pdd->iComplete = 0;

   for (tryit=0; tryit < DeadlockRetry; tryit++)
   {
      if (dbrpcinit(dbproc,"tpcc_delivery",0) == SUCCEED)
```

```
      {
         dbrpcparam(dbproc,NULL,0,SQLINT2,-1,-1,(BYTE *) &pdd->w_id);
         dbrpcparam(dbproc,NULL,0,SQLINT1,-1,-1,(BYTE *) &pdd-
>o_carrier_id);

         if (dbrpcexec(dbproc) == SUCCEED)
         {
            while (((rc = dbresults(dbproc)) != NO_MORE_RESULTS) && (rc !=
FAIL))
            {
               while (((rc = dbnextrow(dbproc)) != NO_MORE_ROWS) && (rc !=
FAIL))
               {
                  for (i = 0; i < 10; i++)
                  {
                     if(pData = dbdata(dbproc,i + 1))
                        pdd->o_id[i] = *((DBINT *)pData);
                     else
                        pdd->o_id[i] = 0;
                  };
               };   // while (dbnextrow)
            };   // while (dbresults)
         };   // if (dbrpcexec)
      };   // if (dbrpcinit)
      if (bDeadlock)
      {
         num_deadlocks++;
         bDeadlock = FALSE;
         userlog("Delivery Deadlock Retry (%d)",num_deadlocks);
         Sleep(10 * tryit);
      }
      else
      {
         GetLocalTime(&pdd->EndTime);
         pdd->iComplete = 1;
         strcpy(pdd->execution_status,"Transaction commited.");
         return(SVC_NOERROR);
      };
   };  // for (tryit)

   // If we reached here, it means we quit after MAX_RETRY deadlocks
   strcpy(pdd->execution_status,"Hit deadlock max.");
   userlog("Delivery Deadlock Failure (%d)",num_deadlocks);
   return(SVCERR_DEADLOCK);

};   // SQLDelivery

//======================================================================
// FUNCTION: WriteLog
//
//    Writes the delivery results to a log file.
//
// ARGUMENTS:
//    pDelivery   delivery information.
//
// RETURNS:
//
// COMMENTS:
//    Record format:
//       QTime,EndTime,Elapsed,w_id,o_carrier_id,o_id1, ... o_id10
//
//======================================================================
void WriteLog(DELIVERY_DATA * pdd)
{
   int elapsed = 9999999;
   if (pdd->iComplete)
      CalculateElapsed(&elapsed,&pdd->QTime,&pdd->EndTime);
   fprintf(fpLog,
      "%2.2d/%2.2d/%2.2d,%2.2d:%2.2d:%2.2d:%3.3d,%2.2d:%2.2d:%2.2d:%3.3d,"
      "%d,%d,%d,%d,%d,%d,%d,%d,%d,%d,%d,%d,%d\r\n",
      pdd->EndTime.wYear - 1900,pdd->EndTime.wMonth,pdd->EndTime.wDay,
      pdd->QTime.wHour,pdd->QTime.wMinute,
      pdd->QTime.wSecond,pdd->QTime.wMilliseconds,
      pdd->EndTime.wHour,pdd->EndTime.wMinute,
      pdd->EndTime.wSecond,pdd->EndTime.wMilliseconds,
      elapsed,pdd->w_id,pdd->o_carrier_id,
      pdd->o_id[0],pdd->o_id[1],pdd->o_id[2],pdd->o_id[3],pdd->o_id[4],
      pdd->o_id[5],pdd->o_id[6],pdd->o_id[7],pdd->o_id[8],pdd->o_id[9] );
       if (bFlush)
             fflush(fpLog);
};   // WriteLog

//======================================================================
// FUNCTION: OpenLogFile
//
//    Opens the delivery log file.
//
// ARGUMENTS:
//    None.
//
// RETURNS:
//    FALSE    Log file successfully opened
//    TRUE     Failed to open log file
//
// COMMENTS:
//
//======================================================================
BOOL OpenLogFile(void)
{
   sprintf(szLogTitle,"%s%ld",LOGFILE_NAME,iServerNo);
   fpLog = fopen(szLogTitle,"ab");
       if (!fpLog)
   {
      sprintf(szWork,"LogFile %s Open Failed (%ld)",
         szLogTitle,GetLastError());
      userlog(szWork);
      return(TRUE);
   };
   return(FALSE);
};   // OpenLogFile

//======================================================================
// FUNCTION: CalculateElapsed
//
//    Calculates the elapsed time of the delivery transaction.
//
// ARGUMENTS:
//    lpBegin  time delivery was queued
//    lpEnd           time delivery update completed
//
// RETURNS:
//    int            pElapsed elapsed time result (in milliseconds)
```

```
//
// COMMENTS:
//    None
//
//=====================================================================
void CalculateElapsed(int * pElapsed,LPSYSTEMTIME lpBegin,
                      LPSYSTEMTIME lpEnd)
{
   int tmBegin;
   int tmEnd;

   tmBegin = (lpBegin->wHour * 3600000) + (lpBegin->wMinute * 60000) +
      (lpBegin->wSecond * 1000) + lpBegin->wMilliseconds;
   tmEnd = (lpEnd->wHour * 3600000) + (lpEnd->wMinute * 60000) +
      (lpEnd->wSecond * 1000) + lpEnd->wMilliseconds;
   *pElapsed = tmEnd - tmBegin;

   // Check for day boundry, this will function for 24 hour period but
   // will fail over a 48 hours period.
   if (*pElapsed < 0)
      *pElapsed = *pElapsed + (24 * 60 * 60 * 1000);
   return;
};   // CalculateElapsed

//=====================================================================
// FUNCTION: UtilStrCpy
//
//    Copies n characters from string pSrc to pDst and places a null
//    null character at the end of the destination string.
//
// ARGUMENTS:
//    char     *pDest   destination string pointer
//    char     *pSrc    source string pointer
//    int      n        number of characters to copy
//
// RETURNS:           None
//
// COMMENTS:
//    Unlike strncpy this function ensures that the result string is
//    always null terminated.
//
//=====================================================================
void UtilStrCpy(char * pDest, char * pSrc, int n)
{
   strncpy(pDest, pSrc, n);
   pDest[n] = '\0';
   return;
};   // UtilStrCpy

//=====================================================================
//
// Function name: GetArgs
//
//=====================================================================
void GetArgs(INT argc, CHAR **argv)
{
   INT j;
   CHAR * ptr;
   BOOL bRslt = TRUE;

   for (j = 1; j < argc; ++j)
   {
      ptr = argv[j];
      switch (ptr[1])
      {
         case 's':
         case 'S':
            strcpy(szServer,ptr+2);
            break;

         case 'd':
         case 'D':
            strcpy(szDatabase,ptr+2);
            break;

         case 'F':
         case 'f':
            bFlush = TRUE;    //turn on delilog flush when written.
            break;

      };   // switch(ptr[1])
   };   // for (j = 1; j < argc; ++j)
};   // GetArgs
```

DELIVERY REPORT MAKEFILE

```
# Microsoft Developer Studio Generated NMAKE File, Format Version 4.20
# ** DO NOT EDIT **

# TARGTYPE "Win32 (x86) Console Application" 0x0103

!IF "$(CFG)" == ""
CFG=delirpt - Win32 Debug
!MESSAGE No configuration specified.  Defaulting to delirpt - Win32 Debug.
!ENDIF

!IF "$(CFG)" != "delirpt - Win32 Release" && "$(CFG)" !=\
 "delirpt - Win32 Debug"
!MESSAGE Invalid configuration "$(CFG)" specified.
!MESSAGE You can specify a configuration when running NMAKE on this
makefile
!MESSAGE by defining the macro CFG on the command line.  For example:
!MESSAGE
!MESSAGE NMAKE /f "delirpt.mak" CFG="delirpt - Win32 Debug"
!MESSAGE
!MESSAGE Possible choices for configuration are:
!MESSAGE
!MESSAGE "delirpt - Win32 Release" (based on "Win32 (x86) Console
Application")
!MESSAGE "delirpt - Win32 Debug" (based on "Win32 (x86) Console
Application")
!MESSAGE
!ERROR An invalid configuration is specified.
!ENDIF

!IF "$(OS)" == "Windows_NT"
NULL=
!ELSE
NULL=nul
!ENDIF
```

```
################################################################################
######
# Begin Project
CPP=cl.exe
RSC=rc.exe

!IF  "$(CFG)" == "delirpt - Win32 Release"

# PROP BASE Use_MFC 0
# PROP BASE Use_Debug_Libraries 0
# PROP BASE Output_Dir "delirpt_"
# PROP BASE Intermediate_Dir "delirpt_"
# PROP BASE Target_Dir ""
# PROP Use_MFC 0
# PROP Use_Debug_Libraries 0
# PROP Output_Dir "delirpt_"
# PROP Intermediate_Dir "delirpt_"
# PROP Target_Dir ""
OUTDIR=.\delirpt_
INTDIR=.\delirpt_

ALL : "$(OUTDIR)\delirpt.exe"

CLEAN :
        -@erase "$(INTDIR)\DELIRPT.OBJ"
        -@erase "$(OUTDIR)\delirpt.exe"

"$(OUTDIR)" :
    if not exist "$(OUTDIR)/$(NULL)" mkdir "$(OUTDIR)"

# ADD BASE CPP /nologo /W3 /GX /O2 /D "WIN32" /D "NDEBUG" /D "_CONSOLE"
/YX /c
# ADD CPP /nologo /W3 /GX /O2 /D "WIN32" /D "NDEBUG" /D "_CONSOLE" /YX /c
CPP_PROJ=/nologo /ML /W3 /GX /O2 /D "WIN32" /D "NDEBUG" /D "_CONSOLE"\
 /Fp"$(INTDIR)/delirpt.pch" /YX /Fo"$(INTDIR)/" /c
CPP_OBJS=.\delirpt_/
CPP_SBRS=.\.
# ADD BASE RSC /l 0x409 /d "NDEBUG"
# ADD RSC /l 0x409 /d "NDEBUG"
BSC32=bscmake.exe
# ADD BASE BSC32 /nologo
# ADD BSC32 /nologo
BSC32_FLAGS=/nologo /o"$(OUTDIR)/delirpt.bsc"
BSC32_SBRS= \

LINK32=link.exe
# ADD BASE LINK32 kernel32.lib user32.lib gdi32.lib winspool.lib
comdlg32.lib advapi32.lib shell32.lib ole32.lib oleaut32.lib uuid.lib
odbc32.lib odbccp32.lib /nologo /subsystem:console /machine:I386
# ADD LINK32 kernel32.lib user32.lib gdi32.lib winspool.lib comdlg32.lib
advapi32.lib shell32.lib ole32.lib oleaut32.lib uuid.lib odbc32.lib
odbccp32.lib /nologo /subsystem:console /machine:I386
LINK32_FLAGS=kernel32.lib user32.lib gdi32.lib winspool.lib comdlg32.lib\
 advapi32.lib shell32.lib ole32.lib oleaut32.lib uuid.lib odbc32.lib\
 odbccp32.lib /nologo /subsystem:console /incremental:no\
 /pdb:"$(OUTDIR)/delirpt.pdb" /machine:I386 /out:"$(OUTDIR)/delirpt.exe"
LINK32_OBJS= \
       "$(INTDIR)\DELIRPT.OBJ"

"$(OUTDIR)\delirpt.exe" : "$(OUTDIR)" $(DEF_FILE) $(LINK32_OBJS)
    $(LINK32) @<<
  $(LINK32_FLAGS) $(LINK32_OBJS)
<<

!ELSEIF  "$(CFG)" == "delirpt - Win32 Debug"

# PROP BASE Use_MFC 0
# PROP BASE Use_Debug_Libraries 1
# PROP BASE Output_Dir "Debug"
# PROP BASE Intermediate_Dir "Debug"
# PROP BASE Target_Dir ""
# PROP Use_MFC 0
# PROP Use_Debug_Libraries 1
# PROP Output_Dir "Debug"
# PROP Intermediate_Dir "Debug"
# PROP Target_Dir ""
OUTDIR=.\Debug
INTDIR=.\Debug

ALL : "$(OUTDIR)\delirpt.exe"

CLEAN :
        -@erase "$(INTDIR)\DELIRPT.OBJ"
        -@erase "$(INTDIR)\vc40.idb"
        -@erase "$(INTDIR)\vc40.pdb"
        -@erase "$(OUTDIR)\delirpt.exe"
        -@erase "$(OUTDIR)\delirpt.ilk"
        -@erase "$(OUTDIR)\delirpt.pdb"

"$(OUTDIR)" :
    if not exist "$(OUTDIR)/$(NULL)" mkdir "$(OUTDIR)"

# ADD BASE CPP /nologo /W3 /Gm /GX /Zi /Od /D "WIN32" /D "_DEBUG" /D
"_CONSOLE" /YX /c
# ADD CPP /nologo /W3 /Gm /GX /Zi /Od /D "WIN32" /D "_DEBUG" /D "_CONSOLE"
/YX /c
CPP_PROJ=/nologo /MLd /W3 /Gm /GX /Zi /Od /D "WIN32" /D "_DEBUG" /D
"_CONSOLE"\
 /Fp"$(INTDIR)/delirpt.pch" /YX /Fo"$(INTDIR)/" /Fd"$(INTDIR)/" /c
CPP_OBJS=.\Debug/
CPP_SBRS=.\.
# ADD BASE RSC /l 0x409 /d "_DEBUG"
# ADD RSC /l 0x409 /d "_DEBUG"
BSC32=bscmake.exe
# ADD BASE BSC32 /nologo
# ADD BSC32 /nologo
BSC32_FLAGS=/nologo /o"$(OUTDIR)/delirpt.bsc"
BSC32_SBRS= \

LINK32=link.exe
# ADD BASE LINK32 kernel32.lib user32.lib gdi32.lib winspool.lib
comdlg32.lib advapi32.lib shell32.lib ole32.lib oleaut32.lib uuid.lib
odbc32.lib odbccp32.lib /nologo /subsystem:console /debug /machine:I386
# ADD LINK32 kernel32.lib user32.lib gdi32.lib winspool.lib comdlg32.lib
advapi32.lib shell32.lib ole32.lib oleaut32.lib uuid.lib odbc32.lib
odbccp32.lib /nologo /subsystem:console /debug /machine:I386
LINK32_FLAGS=kernel32.lib user32.lib gdi32.lib winspool.lib comdlg32.lib\
 advapi32.lib shell32.lib ole32.lib oleaut32.lib uuid.lib odbc32.lib\
 odbccp32.lib /nologo /subsystem:console /incremental:yes\
 /pdb:"$(OUTDIR)/delirpt.pdb" /debug /machine:I386
/out:"$(OUTDIR)/delirpt.exe"
LINK32_OBJS= \
```

```
        "$(INTDIR)\DELIRPT.OBJ"

"$(OUTDIR)\delirpt.exe" : "$(OUTDIR)" $(DEF_FILE) $(LINK32_OBJS)
    $(LINK32) @<<
  $(LINK32_FLAGS) $(LINK32_OBJS)
<<

!ENDIF

.c{$(CPP_OBJS)}.obj:
   $(CPP) $(CPP_PROJ) $<

.cpp{$(CPP_OBJS)}.obj:
   $(CPP) $(CPP_PROJ) $<

.cxx{$(CPP_OBJS)}.obj:
   $(CPP) $(CPP_PROJ) $<

.c{$(CPP_SBRS)}.sbr:
   $(CPP) $(CPP_PROJ) $<

.cpp{$(CPP_SBRS)}.sbr:
   $(CPP) $(CPP_PROJ) $<

.cxx{$(CPP_SBRS)}.sbr:
   $(CPP) $(CPP_PROJ) $<

################################################################################
######
# Begin Target

# Name "delirpt - Win32 Release"
# Name "delirpt - Win32 Debug"

!IF  "$(CFG)" == "delirpt - Win32 Release"

!ELSEIF  "$(CFG)" == "delirpt - Win32 Debug"

!ENDIF

################################################################################
######
# Begin Source File

SOURCE=.\DELIRPT.C

"$(INTDIR)\DELIRPT.OBJ" : $(SOURCE) "$(INTDIR)"


# End Source File
# End Target
# End Project
################################################################################
######
```

delirpt.c

```
//   FILE:             DELIRPT.C
//   Copyright Microsoft, 1996

#include <windows.h>
#include <stdio.h>
#include <stdlib.h>

#define LOGFILE_READ_EOF      0
                        //check log file flag return current state
#define LOGFILE_CLEAR_EOF     1
                        //clear end of log file flag
#define LOGFILE_SET_EOF             2
                              //set flag end of log file reached

#define INTERVAL                    .01
                              //90th percentile calculation bucket
interval

#define ERR_SUCCESS                                           1000
                        //success no error
#define ERR_READING_LOGFILE                         1001
              //io errors occured reading delivery log file
#define ERR_INSUFFICIENT_MEMORY                     1002
              //insuficient memory to process 90th percentile report
#define ERR_CANNOT_OPEN_RESULTS_FILE  1005
       //Cannot open delivery results file delilog.

typedef struct _RPTLINE
{
       SYSTEMTIME     start;
                              //delilog report line start time
       SYSTEMTIME     end;
                              //delilog report line end time
       int                    response;
                                     //delilog report line time delivery
took in milliseconds
       int                    w_id;
                                     //delilog report line warehouse id
for delivery
       int                    o_carrier_id;
                              //delilog report line carier id for delivery
       int                    items[10];
                                     //delilog report line delivery line
items
} RPTLINE, *PRPTLINE;

//error message structure used in ErrorMessage API
typedef struct _SERRORMSG
{
       int            iError;                      //error id of message
       char    szMsg[80];                  //message to sent to browser
} SERRORMSG;

int                           versionMS = 4;
              //delirpt version
int                           versionMM = 0;
int                           versionLS = 0;
int                           iReport;
                       //delirpt report to process
int                           iStartTime;
                       //begin times to accept for report
int                           iEndTime;
                       //end times to accept for report
```

```
FILE                    *fpLog;
                //log file stream
CHAR szLogFileTitle[100];
#define DEFAULTLOGTITLE "delilog."

//Local function prototypes
void            main(int argc, char *argv[]);
static int      Init(void);
static void     Restore(void);
static int      DoReport(void);
int                     AverageResponse(void);
int                     SkippedDelivery(void);
int                     Percentile90th(void);
BOOL            CheckTimes(PRPTLINE pRptLine);
static int      OpenLogFile(void);
static void     CloseLogFile(void);
static void     ResetLogFile(void);
static BOOL     LogEOF(int iOperation);
static BOOL     ReadReportLine(char *szBuffer, PRPTLINE pRptLine);
static BOOL     ParseReportLine(char *szLine, PRPTLINE pRptLine);
static BOOL     ParseDate(char *szDate, LPSYSTEMTIME pTime);
static BOOL     ParseTime(char *szTime, LPSYSTEMTIME pTime);
static void     ErrorMessage(int iError);
static BOOL     GetParameters(int argc, char *argv[]);
static void     PrintParameters(void);
static void     PrintHeader(void);
static void     cls(void);
static BOOL     IsNumeric(char *ptr);


/* FUNCTION: int main(int argc, char *argv[])
 *
 * PURPOSE:    This function is the beginning execution point for the
delivery executable.
 *
 * ARGUMENTS:  int             argc    number of command line arguments
passed to delivery
 *                             char    *argv[] array of command line
argument pointers
 *
 * RETURNS:            None
 *
 * COMMENTS:   None
 *
 */

void main(int argc, char *argv[])
{
        int     iError;

        PrintHeader();

        if ( GetParameters(argc, argv) )
        {
                PrintParameters();
                return;
        }

        if ( (iError=Init()) != ERR_SUCCESS )
        {
                ErrorMessage(iError);
                Restore();
                return;
        }

        if ( (iError = DoReport()) != ERR_SUCCESS )
                ErrorMessage(iError);

        Restore();

        return;
}

/* FUNCTION: static int Init(void)
 *
 * PURPOSE:    This function initializes the delirtp application.
 *
 * ARGUMENTS:  None
 *
 * RETURNS:            None
 *
 * COMMENTS:   None
 *
 */

static int Init(void)
{
        int iError;

        if ( (iError = OpenLogFile()) )
                return iError;
        return TRUE;
}

/* FUNCTION: static void Restore(void)
 *
 * PURPOSE:    This function cleans up the delirpt application before
termination.
 *
 * ARGUMENTS:  None
 *
 * RETURNS:            None
 *
 * COMMENTS:   None
 *
 */

static void Restore(void)
{
        CloseLogFile();
        return;
}

/* FUNCTION: static int DoReport(void)
 *
 * PURPOSE:            This function dispatches the requested report.
 *
 * ARGUMENTS:  None
 *
 * RETURNS:            ERR_SUCCESS if successfull or error code if an
error occurs.
 *
```

```
 * COMMENTS:   None
 *
 */

static int DoReport(void)
{
        int iRc;

        switch(iReport)
        {
                case 1:
                        iRc = AverageResponse();
                        break;
                case 2:
                        iRc = Percentile90th();
                        break;
                case 3:
                        iRc = SkippedDelivery();
                        break;
                case 4:
                        if ( (iRc = AverageResponse()) != ERR_SUCCESS )
                                break;
                        if ( (iRc = Percentile90th()) != ERR_SUCCESS )
                                break;
                        if ( (iRc = SkippedDelivery()) != ERR_SUCCESS )
                                break;
                        break;
        }
        return iRc;
}

/* FUNCTION: int AverageResponse(void)
 *
 * PURPOSE:            This function processes the AverageResponse report.
 *
 * ARGUMENTS:  None
 *
 * RETURNS:            ERR_SUCCESS if successfull or error code if an
error occurs.
 *
 * COMMENTS:   None
 *
 */

int AverageResponse(void)
{
        RPTLINE reportLine;
        int             iTotalResponse;
        int             iLines;
        double  fAverage;
        char    szDelivery[128];

        ResetLogFile();

        iTotalResponse = 0;
        iLines = 0;
        printf("\n\n******** Average Response Time Report *******\n");
        while ( !LogEOF(LOGFILE_READ_EOF) )
        {
                if ( ReadReportLine(szDelivery, &reportLine) )
                        return ERR_READING_LOGFILE;
                if ( !LogEOF(LOGFILE_READ_EOF) )
                {
                        if ( CheckTimes(&reportLine) )
                                continue;
                        iLines++;
                        iTotalResponse += reportLine.response;

                        if ( iLines % 10 == 0 )
                                printf("Reading Report Line:\t%d\r",
iLines);
                }
        }
        printf("                                                \r");
        if ( iLines == 0 )
        {
                printf("No deliveries found.\n");
        }
        else
        {
                fAverage = ((double)iTotalResponse /
(double)iLines)/(double)1000;
                printf("Total Deliveries:      %10.0f\n", (float)iLines);
                printf("Total Response Times:  %10.3f\n",
((float)iTotalResponse/(float)1000));
                printf("Average Response Time: %10.3f\n", fAverage);
        }

        return ERR_SUCCESS;
}

/* FUNCTION: int Percentile90th(void)
 *
 * PURPOSE:            This function processes the 90th percentile report.
 *
 * ARGUMENTS:  None
 *
 * RETURNS:            ERR_SUCCESS if successfull or error code if an
error occurs.
 *
 * COMMENTS:   This function requires enough space to allocate needed
 *                             buckets which will be 2 * max response time
in
 *                             deci-seconds.
 *
 */

int Percentile90th(void)
{
        RPTLINE reportLine;
        int             iBucketSize;
        int             i;
        int             iResponseSeconds;
        int             iMaxSeconds;
        int             iTotalBuckets;
        double  iTotal;
        double  i90thPercent;
        short   *psBuckets;
        char    szDelivery[128];

        printf("\n\n******** 90th Percentile *******\n");
        printf("Calculating Max Response Seconds...\n");
```

```
        ResetLogFile();

        iMaxSeconds = -1;
        while ( !LogEOF(LOGFILE_READ_EOF) )
        {
                if ( ReadReportLine(szDelivery, &reportLine) )
                        return ERR_READING_LOGFILE;
                if ( szDelivery[0] == '*' )
                        continue;
                if ( !LogEOF(LOGFILE_READ_EOF) )
                {
                        if ( iMaxSeconds < reportLine.response )
                                iMaxSeconds = reportLine.response;
                }
        }

    iTotalBuckets = iMaxSeconds + 1;

        printf("Allocating Buckets...\n");

        iBucketSize = iTotalBuckets * sizeof(short);

        if ( !(psBuckets = (short *)malloc(iBucketSize)) )
                return ERR_INSUFFICIENT_MEMORY;

        ZeroMemory(psBuckets, iBucketSize);

        iTotal = 0;

        ResetLogFile();
        printf("Calculating Distribution...\n");

        iMaxSeconds = -1;
        while ( !LogEOF(LOGFILE_READ_EOF) )
        {
                if ( ReadReportLine(szDelivery, &reportLine) )
                        return ERR_READING_LOGFILE;
                if ( szDelivery[0] == '*' )
                        continue;
                if ( !LogEOF(LOGFILE_READ_EOF) )
                {
                        if ( CheckTimes(&reportLine) )
                                continue;
                        psBuckets[reportLine.response]++;
                        iTotal++;
                        if ( iMaxSeconds < reportLine.response )
                                iMaxSeconds = reportLine.response;
                }
        }

        printf("Max Response Time = %d.%d\n",
       (iMaxSeconds / 1000),(iMaxSeconds % 1000));

        i90thPercent = iTotal * .9;

        for(i=0, iTotal = 0.0; iTotal < i90thPercent; iTotal +=
(double)psBuckets[i] )
                i++;

        printf("90th Percentile = %d.%d\n", i/1000, (i % 1000));

        free(psBuckets);

        return ERR_SUCCESS;
}

/* FUNCTION: int SkippedDelivery(void)
 *
 * PURPOSE:            This function processes the Skipped Deliveries
report.
 *
 * ARGUMENTS:  None
 *
 * RETURNS:            ERR_SUCCESS if successfull or error code if an
error occurs.
 *
 * COMMENTS:   None
 *
 */

int SkippedDelivery(void)
{
        RPTLINE reportLine;
        char    szDelivery[128];
        int             i;
        int             items[10];

        ResetLogFile();

        printf("\n\n******** Skipped Delivery Report *******\n");
        memset(items, 0, sizeof(items));
        printf("Reading Delivery Log File...");

        while ( !LogEOF(LOGFILE_READ_EOF) )
        {
                if ( ReadReportLine(szDelivery, &reportLine) )
                        return ERR_READING_LOGFILE;
                if ( !LogEOF(LOGFILE_READ_EOF) )
                {
                        if ( CheckTimes(&reportLine) )
                                continue;
                        for(i=0; i<10; i++)
                        {
                                if ( !reportLine.items[i] )
                                        items[i]++;
                        }
                }
        }
        printf("\n");
        printf("Skipped delivery table.\n");
        printf("  1    2    3    4    5    6    7    8    9   10 \n");
        printf("---- ---- ---- ---- ---- ---- ---- ---- ---- ----\n");
        for(i=0; i<10; i++)
                printf("%4.4d ", items[i]);
        printf("\n");

        return ERR_SUCCESS;
}

/* FUNCTION: BOOL CheckTimes(PRPTLINE pRptLine)
 *
```

```
 * PURPOSE:    This function checks to see of the delilog record falls
withing the
 *                     begin and end time from the command line.
 *
 * ARGUMENTS:  PRPTLINE       pRptLine       delilog processed report
line.
 *
 * RETURNS:            BOOL    FALSE   if report line is not within the
 *                                                      requested
start and end times.
 *                                          TRUE    if the report line is
within the
 *                                                      requested
start and end times.
 *
 * COMMENTS:   If startTime and endTime are both 0 then the user requested
 *                             the default behavior which is all records in
delilog are
 *                             valid.
 */

BOOL CheckTimes(PRPTLINE pRptLine)
{
        int     iRptEndTime;
        int     iRptStartTime;

        iRptStartTime = (pRptLine->start.wHour * 3600000) + (pRptLine-
>start.wMinute * 60000) + (pRptLine->start.wSecond * 1000) + pRptLine-
>start.wMilliseconds;
        iRptEndTime = (pRptLine->end.wHour * 3600000) + (pRptLine-
>end.wMinute * 60000) + (pRptLine->end.wSecond * 1000) + pRptLine-
>end.wMilliseconds;

        if ( iStartTime == 0 && iEndTime == 0 )
                return FALSE;

        if ( iStartTime <= iRptStartTime && iEndTime >= iRptEndTime )
                return FALSE;

        return TRUE;
}

/* FUNCTION: int OpenLogFile(void)
 *
 * PURPOSE:    This function opens the delivery log file for use.
 *
 * ARGUMENTS:  None
 *
 * RETURNS:            int     ERR_CANNOT_OPEN_RESULTS_FILE  Cannot create
results log file.
 *                                     ERR_SUCCESS
                     Log file successfully opened
 *
 *
 * COMMENTS:   None
 *
 */

static int OpenLogFile(void)
{
        fpLog = fopen(szLogFileTitle, "rb");

        if ( !fpLog )
                return ERR_CANNOT_OPEN_RESULTS_FILE;

        return ERR_SUCCESS;
}

/* FUNCTION: int CloseLogFile(void)
 *
 * PURPOSE:    This function closes the delivery log file.
 *
 * ARGUMENTS:  None
 *
 * RETURNS:            None
 *
 * COMMENTS:   None
 *
 */

static void CloseLogFile(void)
{
        if ( fpLog )
                fclose(fpLog);

        return;
}


/* FUNCTION: static void ResetLogFile(void)
 *
 * PURPOSE:    This function prepares the delilog. file for reading
 *
 * ARGUMENTS:  None
 *
 * RETURNS:            None
 *
 * COMMENTS:   None
 *
 */

static void ResetLogFile(void)
{
        fseek(fpLog, 0L, SEEK_SET);
        LogEOF(LOGFILE_CLEAR_EOF);

        return;
}

/* FUNCTION: static BOOL LogEOF(int iOperation)
 *
 * PURPOSE:    This function tracks and reports the end of file condition
 *                     on the delilog file.
 *
 * ARGUMENTS:  int iOperation requested operation this can be:
 *
        LOGFILE_READ_EOF       check log file flag return current state
 *
        LOGFILE_CLEAR_EOF      clear end of log file flag
 *
        LOGFILE_SET_EOF                set flag end of log file reached
```

```
 *
 *
 * RETURNS:            None
 *
 * COMMENTS:   None
 *
 */

static BOOL LogEOF(int iOperation)
{
        static BOOL bEOF;

        switch(iOperation)
        {
                case LOGFILE_READ_EOF:
                        return bEOF;
                        break;
                case LOGFILE_CLEAR_EOF:
                        bEOF = FALSE;
                        break;
                case LOGFILE_SET_EOF:
                        bEOF = TRUE;
                        break;
        }
        return FALSE;
}

/* FUNCTION: static BOOL ReadReportLine(char *szBuffer, PRPTLINE pRptLine)
 *
 * PURPOSE:    This function reads a text line from the delilog file.
 *                     on the delilog file.
 *
 * ARGUMENTS:  char            *szBuffer      buffer to placed read delilog
file line into.
 *                             PRPTLINE       pRptLine       returned
structure containing parsed delilog
 *
        report line.
 *
 * RETURNS:            FALSE   if successfull or TRUE if an error occurs.
 *
 * COMMENTS:   None
 *
 */

static BOOL ReadReportLine(char *szBuffer, PRPTLINE pRptLine)
{
        int i = 0;
        int ch;
        int iEof;

        while( i < 128 )
        {
                ch = fgetc(fpLog);
                if ( iEof = feof(fpLog) )
                        break;
                if ( ch == '\r' )
                {
                        if ( i )
                                break;
                        continue;
                }
                if ( ch == '\n' )
                        continue;
                szBuffer[i++] = ch;

        }

        //delivery item format is to long cannot be a valid delivery item
        if ( i >= 128 )
                return TRUE;

        szBuffer[i] = 0;
        if ( iEof )
        {
                LogEOF(LOGFILE_SET_EOF);
                if ( i == 0 )
                        return FALSE;
        }
        return ParseReportLine(szBuffer, pRptLine);
}

/* FUNCTION: static BOOL ParseReportLine(char *szLine, PRPTLINE pRptLine)
 *
 * PURPOSE:    This function reads a text line from the delilog file.
 *                     on the delilog file.
 *
 * ARGUMENTS:  char            *szLine        buffer containing the delilog
file line to be parsed.
 *                             PRPTLINE       pRptLine       returned
structure containing parsed delilog
 *
        report line values.
 *
 * RETURNS:            FALSE   if successfull or TRUE if an error occurs.
 *
 * COMMENTS:   None
 *
 */

static BOOL ParseReportLine(char *szLine, PRPTLINE pRptLine)
{
        int i;

        if ( ParseDate(szLine, &pRptLine->start) )
                return TRUE;

        pRptLine->end.wYear = pRptLine->start.wYear;
        pRptLine->end.wMonth = pRptLine->start.wMonth;
        pRptLine->end.wDay = pRptLine->start.wDay;

        if ( !(szLine = strchr(szLine, ',')) )
                return TRUE;
        szLine++;

        if ( ParseTime(szLine, &pRptLine->start) )
                return TRUE;

        if ( !(szLine = strchr(szLine, ',')) )
                return TRUE;
        szLine++;
```

```
        if ( ParseTime(szLine, &pRptLine->end) )
                return TRUE;

        if ( !(szLine = strchr(szLine, ',')) )
                return TRUE;
        szLine++;

        if ( !IsNumeric(szLine) )
                return TRUE;
        pRptLine->response = atoi(szLine);

        if ( !(szLine = strchr(szLine, ',')) )
                return TRUE;
        szLine++;

        if ( !IsNumeric(szLine) )
                return TRUE;
        pRptLine->w_id = atoi(szLine);

        if ( !(szLine = strchr(szLine, ',')) )
                return TRUE;
        szLine++;

        if ( !IsNumeric(szLine) )
                return TRUE;
        pRptLine->o_carrier_id = atoi(szLine);

        if ( !(szLine = strchr(szLine, ',')) )
                return TRUE;
        szLine++;

        for(i=0; i<10; i++)
        {
                if ( !IsNumeric(szLine) )
                        return TRUE;
                pRptLine->items[i] = atoi(szLine);

                if ( i<9 && !(szLine = strchr(szLine, ',')) )
                        return TRUE;
                szLine++;
        }

        return FALSE;
}

/* FUNCTION: static BOOL ParseDate(char *szDate, LPSYSTEMTIME pTime)
 *
 * PURPOSE:    This function validates and extracts a date string in the
format
 *                     yy/mm/dd into an SYSTEMTIME structure.
 *
 * ARGUMENTS:  char                    *szDate        buffer containing the
date to be parsed.
 *                           LPSYSTEMTIME   pTime          system time
structure where date will be placed.
 *
 * RETURNS:            FALSE if successfull or TRUE if an error occurs.
 *
 * COMMENTS:   None
 *
 */

static BOOL ParseDate(char *szDate, LPSYSTEMTIME pTime)
{
        if ( !isdigit(*szDate) || !isdigit(*(szDate+1)) || *(szDate+2) !=
'/' ||
                !isdigit(*(szDate+3)) || !isdigit(*(szDate+4)) ||
*(szDate+5) != '/' ||
                !isdigit(*(szDate+6)) || !isdigit(*(szDate+7)) )
                return TRUE;

        pTime->wYear = atoi(szDate);

        pTime->wMonth = atoi(szDate+3);

        pTime->wDay = atoi(szDate+6);

        if ( pTime->wMonth > 12 || pTime->wMonth < 0 || pTime->wDay > 31
|| pTime->wDay < 0 )
                return TRUE;

        return FALSE;
}

/* FUNCTION: static BOOL ParseTime(char *szTime, LPSYSTEMTIME pTime)
 *
 * PURPOSE:    This function validates and extracts a time string in the
format
 *                     hh:mm:ss:mmm into an SYSTEMTIME structure.
 *
 * ARGUMENTS:  char                    *szTime        buffer containing the
time to be parsed.
 *                           LPSYSTEMTIME   pTime          system time
structure where date will be placed.
 *
 * RETURNS:            FALSE if successfull or TRUE if an error occurs.
 *
 * COMMENTS:   None
 *
 */

static BOOL ParseTime(char *szTime, LPSYSTEMTIME pTime)
{
        if ( !isdigit(*szTime) || !isdigit(*(szTime+1)) || *(szTime+2) !=
':' ||
                !isdigit(*(szTime+3)) || !isdigit(*(szTime+4)) ||
*(szTime+5) != ':' ||
                !isdigit(*(szTime+6)) || !isdigit(*(szTime+7)) ||
*(szTime+8) != ':' ||
                !isdigit(*(szTime+9)) || !isdigit(*(szTime+10)) ||
!isdigit(*(szTime+11)) )
                return TRUE;

        pTime->wHour = atoi(szTime);
        pTime->wMinute = atoi(szTime+3);
        pTime->wSecond = atoi(szTime+6);
        pTime->wMilliseconds  = atoi(szTime+9);

        if ( pTime->wHour > 23 || pTime->wHour < 0 ||
                pTime->wMinute > 59 || pTime->wMinute < 0 ||
                pTime->wSecond > 59 || pTime->wSecond < 0 ||
                pTime->wMilliseconds < 0 )
```

```
                return TRUE;

        if ( pTime->wMilliseconds > 999 )
        {
                pTime->wSecond += (pTime->wMilliseconds/1000);
                pTime->wMilliseconds = pTime->wMilliseconds  % 1000;
        }

        return FALSE;
}

/* FUNCTION: void ErrorMessage(int iError)
 *
 * PURPOSE:    This function displays an error message in the delivery
executable's console window.
 *
 * ARGUMENTS:  int             iError  error id to be displayed
 *
 * RETURNS:            None
 *
 * COMMENTS:   None
 *
 */

static void ErrorMessage(int iError)
{
        int i;

        static SERRORMSG errorMsgs[] =
        {
                {       ERR_SUCCESS,
                "Success, no error."
                                                },
                {       ERR_CANNOT_OPEN_RESULTS_FILE,
        "Cannot open delivery results log file."
                },
                {       ERR_READING_LOGFILE,
        "Reading delivery log file, Delivery item format incorrect."
        },
                {       ERR_INSUFFICIENT_MEMORY,
        "insufficient memory to process 90th percentile report."
        },
                {       0,
                                ""


                }
        };

        for(i=0; errorMsgs[i].szMsg[0]; i++)
        {
                if ( iError == errorMsgs[i].iError )
                {
                        printf("\nError(%d): %s\n", iError,
errorMsgs[i].szMsg);
                        return;
                }
        }
        printf("Error(%d): %s", errorMsgs[0].szMsg);
        return;
}
```

```
/* FUNCTION: BOOL GetParameters(int argc, char *argv[])
 *
 * PURPOSE:    This function parses the command line passed in to the
delivery executable, initializing
 *                      and filling in global variable parameters.
 *
 * ARGUMENTS:  int             argc    number of command line arguments
passed to delivery
 *                             char    *argv[] array of command line
argument pointers
 *
 * RETURNS:            BOOL    FALSE   parameter read successfull
 *                                             TRUE    user has requested
parameter information screen be displayed.
 *
 * COMMENTS:   None
 *
 */

static BOOL GetParameters(int argc, char *argv[])
{
        int                     i;
        SYSTEMTIME      startTime;
        SYSTEMTIME      endTime;
   UINT uLogTitleLen;

        iStartTime = 0;
        iEndTime = 0;
        iReport = 4;
   strcpy(szLogFileTitle,DEFAULTLOGTITLE);

        for(i=0; i<argc; i++)
        {
                if ( argv[i][0] == '-' || argv[i][0] == '/' )
                {
                        switch(argv[i][1])
                        {
                                case 'S':
                                case 's':
                                        if ( ParseTime(argv[i]+2,
&startTime) )
                                                return TRUE;
                                        iStartTime = (startTime.wHour *
3600000) + (startTime.wMinute * 60000) + (startTime.wSecond * 1000) +
startTime.wMilliseconds;
                                        break;
                                case 'E':
                                case 'e':
                                        if ( ParseTime(argv[i]+2, &endTime)
)
                                                return TRUE;
                                        iEndTime = (endTime.wHour * 3600000)
+ (endTime.wMinute * 60000) + (endTime.wSecond * 1000) +
endTime.wMilliseconds;
                                        break;
                                case 'R':
                                case 'r':
                                        iReport = atoi(argv[i]+2);
                                        if ( iReport > 4 || iReport < 1 )
                                                iReport = 4;
                                        break;
```

```
                                case 'F':
                                case 'f':
                        uLogTitleLen = strlen(argv[i] - 2);
                        if (uLogTitleLen > 0 && uLogTitleLen <
sizeof(szLogFileTitle))
                        {
                           strcpy(szLogFileTitle,argv[i]+2);
                           printf("Log File Title set to %s",szLogFileTitle);
                        };
                                        break;
                                case '?':
                                        return TRUE;
                                }
                        }
                }
                return FALSE;
}

/* FUNCTION: void PrintParameters(void)
 *
 * PURPOSE:    This function displays the supported command line flags.
 *
 * ARGUMENTS:  None
 *
 * RETURNS:            None
 *
 * COMMENTS:   None
 *
 */

static void PrintParameters(void)
{
        PrintHeader();
        printf("DELIRPT:\n\n");
        printf("Parameter
Default\n");
        printf("-----------------------------------------------------------
-------------\n");
        printf("-S Start Time HH:MM:SS:MMM
All    \n");
        printf("-E End Time HH:MM:SS:MMM
All    \n");
        printf("-R 1)Average Response, 2)90th 3) Skipped 4) All
All    \n");
        printf("-? This help screen\n\n");
        printf("Note:  Command line switches are NOT case sensitive.\n");

        return;
}

/* FUNCTION: void PrintHeader(void)
 *
 * PURPOSE:    This function displays the delivery report applications
banner information.
 *
 * ARGUMENTS:  None
 *
 * RETURNS:            None
 *
 * COMMENTS:   None
 *
 */

static void PrintHeader(void)
{
        //cls();

        printf("************************************************\n");
        printf("*                                              *\n");
        printf("*  Delivery Log Analysis Program               *\n");
        printf("*                                              *\n");
        printf("*                                              *\n");
        printf("************************************************\n\n");

        return;
}

/* FUNCTION: void cls(void)
 *
 * PURPOSE:    This function clears the console window
 *
 * ARGUMENTS:  None
 *
 * RETURNS:            None
 *
 * COMMENTS:   None
 *
 */

static void cls(void)
{
        HANDLE  hConsole;
        COORD   coordScreen = { 0, 0 };                         //here's where
we'll home the cursor
        DWORD   cCharsWritten;
        CONSOLE_SCREEN_BUFFER_INFO    csbi;          //to get buffer info
        DWORD                                        dwConSize;
        //number of character cells in the current buffer

        hConsole = GetStdHandle(STD_OUTPUT_HANDLE);

        //get the number of character cells in the current buffer

        GetConsoleScreenBufferInfo( hConsole, &csbi );
        dwConSize = csbi.dwSize.X * csbi.dwSize.Y;

        //fill the entire screen with blanks
        FillConsoleOutputCharacter( hConsole, (TCHAR) ' ', dwConSize,
coordScreen, &cCharsWritten );
        GetConsoleScreenBufferInfo( hConsole, &csbi );

        //now set the buffer's attributes accordingly
        FillConsoleOutputAttribute( hConsole, csbi.wAttributes,dwConSize,
coordScreen, &cCharsWritten );

        //put the cursor at (0, 0)
        SetConsoleCursorPosition( hConsole, coordScreen );

        return;
}

/* FUNCTION: BOOL IsNumeric(char *ptr)
```

```
 *
 * PURPOSE:    This function determines if a string is numeric. It fails
if any characters other
 *                     than numeric and null terminator are present.
 *
 * ARGUMENTS:  char                  *ptr    pointer to string to check.
 *
 * RETURNS:            BOOL    FALSE   if string is not all numeric
 *                                     TRUE    if string contains
only numeric characters i.e. '0' - '9'
 *
 * COMMENTS:   A comma is counted as a valid delimiter.
 *
 */

static BOOL IsNumeric(char *ptr)
{
        if ( *ptr == 0 )
                return FALSE;

        while( *ptr && isdigit(*ptr) )
                ptr++;
        if ( !*ptr || *ptr == ',' )
                return TRUE;
        else
                return FALSE;
}
```

Appendix B - Database Design

Build Scripts

BACKUP.SQL

```
--  File:     BACKUP.SQL
--            Microsoft TPC-C Benchmark Kit Ver. 4.00
--            Copyright Microsoft, 1996
--  Purpose:  Creates backup of tpcc database


declare @startdate datetime
declare @enddate datetime
select @startdate = getdate()
select "Start date:", convert(varchar(30),@startdate,9)

backup database tpcc to tpccback1, tpccback2, tpccback3,
                      tpccback4, tpccback5, tpccback6 with init,
                       stats = 5

select @enddate = getdate()
select "End date: ", convert(varchar(30),@enddate,9)
select "Elapsed time (in seconds): ", datediff(second, @startdate,
@enddate)

go
```

CREATEDB.SQL

```
--  File:     CREATEDB.SQL
--            Microsoft TPC-C Benchmark Kit Ver. 4.00
--            Copyright Microsoft, 1996
--  Purpose:  Creates tpcc database and backup files
--            for 1968 warehouses.

use master
go

--  remove any existing database and backup files

exec sp_dbremove tpcc, dropdev
exec sp_dropdevice 'tpccback1', delfile
exec sp_dropdevice 'tpccback2', delfile
exec sp_dropdevice 'tpccback3', delfile
exec sp_dropdevice 'tpccback4', delfile
exec sp_dropdevice 'tpccback5', delfile
exec sp_dropdevice 'tpccback6', delfile
go

declare @startdate datetime
declare @enddate datetime
select @startdate = getdate()
select "Start date:", convert(varchar(30),@startdate,9)

--  create main database files

create database tpcc on
       (name="MSSQL70_tpcc_root",filename="C:\MSSQL7\Data\tpcc_root.mdf",
size=10MB, FILEGROWTH=0)
log on
       (name="MSSQL70_tpcc_log",filename="L:",size=61001MB, FILEGROWTH=0)

--  create filegroups

alter database tpcc add filegroup MSSQL70_misc_fg
alter database tpcc add filegroup MSSQL70_cs_fg

--  add files to filegroups

alter database tpcc add file
       (name="MSSQL70_misc1",filename="M:",size=7875MB, FILEGROWTH=0),
       (name="MSSQL70_misc2",filename="N:",size=7875MB, FILEGROWTH=0),
       (name="MSSQL70_misc3",filename="O:",size=7875MB, FILEGROWTH=0),
       (name="MSSQL70_misc4",filename="P:",size=7875MB, FILEGROWTH=0),
       (name="MSSQL70_misc5",filename="Q:",size=7875MB, FILEGROWTH=0),
       (name="MSSQL70_misc6",filename="R:",size=7875MB, FILEGROWTH=0),
       (name="MSSQL70_misc7",filename="S:",size=7875MB, FILEGROWTH=0)
to filegroup MSSQL70_misc_fg

alter database tpcc add file
       (name="MSSQL70_cs1",filename="E:",size=16800MB, FILEGROWTH=0),
       (name="MSSQL70_cs2",filename="F:",size=16800MB, FILEGROWTH=0),
       (name="MSSQL70_cs3",filename="G:",size=16800MB, FILEGROWTH=0),
       (name="MSSQL70_cs4",filename="H:",size=16800MB, FILEGROWTH=0),
       (name="MSSQL70_cs5",filename="I:",size=16800MB, FILEGROWTH=0),
       (name="MSSQL70_cs6",filename="J:",size=16800MB, FILEGROWTH=0),
       (name="MSSQL70_cs7",filename="K:",size=16800MB, FILEGROWTH=0)
to filegroup MSSQL70_cs_fg

select @enddate = getdate()
select "End date: ", convert(varchar(30),@enddate,9)
select "Elapsed time (in seconds): ", datediff(second, @startdate,
@enddate)
go

--  create backup devices

exec sp_addumpdevice 'disk','tpccback1','T:\tpccback1.dmp'
exec sp_addumpdevice 'disk','tpccback2','U:\tpccback2.dmp'
exec sp_addumpdevice 'disk','tpccback3','V:\tpccback3.dmp'
exec sp_addumpdevice 'disk','tpccback4','T:\tpccback4.dmp'
exec sp_addumpdevice 'disk','tpccback5','U:\tpccback5.dmp'
exec sp_addumpdevice 'disk','tpccback6','V:\tpccback6.dmp'
go
```

DBOPT1.SQL

```
--  File:     DBOPT1.SQL
--            Microsoft TPC-C Benchmark Kit Ver. 4.00
--            Copyright Microsoft, 1996
```

```
--  Purpose:  Sets database options for data load


use master
go

exec sp_dboption tpcc,'select into/bulkcopy',true
exec sp_dboption tpcc,'trunc. log on chkpt.',true
go

use tpcc
go

checkpoint
go
```

DBOPT2.SQL

```
--  File:     DBOPT2.SQL
--            Microsoft TPC-C Benchmark Kit Ver. 4.01
--            Copyright Microsoft, 1996
--  Purpose:  Resets database options after data load


use master
go

sp_dboption tpcc,'select ',false
go

sp_dboption tpcc,'trunc. ',false
go

use tpcc
go

checkpoint
go

sp_configure allow,1
go

reconfigure with override
go

/*                                              */
/* Set option values for user-defined indexes */
/*                                              */

sp_indexoption 'customer','AllowPageLocks',FALSE
go
sp_indexoption 'district','AllowPageLocks',FALSE
go
sp_indexoption 'warehouse','AllowPageLocks',FALSE
go
sp_indexoption 'stock','AllowPageLocks',FALSE
go
sp_indexoption 'order_line','AllowRowLocks',FALSE
go
sp_indexoption 'orders','AllowRowLocks',FALSE
go
sp_indexoption 'new_order','AllowRowLocks',FALSE
go
sp_indexoption 'item','AllowRowLocks',FALSE
go
sp_indexoption 'item','AllowPageLocks',FALSE
go

Print ' '
Print '******************'
Print 'Pre-specified Locking Hierarchy:'
Print '   Lockflag = 0 ==> No pre-specified hierarchy'
Print '   Lockflag = 1 ==> Lock at Page-level then Table-level'
Print '   Lockflag = 2 ==> Lock at Row-level then Table-level'
Print '   Lockflag = 3 ==> Lock at Table-level'
Print ' '

select name,lockflags
from sysindexes
where object_id("warehouse")=id or
         object_id("district")=id or
         object_id("customer")=id or
         object_id("stock")=id or
         object_id("orders")=id or
         object_id("order_line")=id or
         object_id("history")=id or
         object_id("new_order")=id or
         object_id("item")=id
order by lockflags asc
go

sp_configure allow,0
go

reconfigure with override
go

exec sp_dboption tpcc, 'auto update statistics', FALSE
exec sp_dboption tpcc, 'auto create statistics', FALSE
go

exec sp_tableoption "district","pintable",true
exec sp_tableoption "warehouse","pintable",true
exec sp_tableoption "new_order","pintable",true
exec sp_tableoption "item","pintable",true
go
```

IDXCUSCL.SQL

```
--  File:     IDXCUSCL.SQL
--            Microsoft TPC-C Benchmark Kit Ver. 4.00
--            Copyright Microsoft, 1996
--  Purpose:  Creates clustered index on customer table


use tpcc
go
```

```
declare @startdate datetime
declare @enddate datetime
select @startdate = getdate()
select "Start date:", convert(varchar(30),@startdate,9)

if exists ( select name from sysindexes where name = 'customer_c1' )
        drop index customer.customer_c1

create unique clustered index customer_c1 on customer(c_w_id, c_d_id,
c_id)
        on MSSQL70_cs_fg

select @enddate = getdate()
select "End date: ", convert(varchar(30),@enddate,9)
select "Elapsed time (in seconds): ", datediff(second, @startdate,
@enddate)

go
```

IDXCUSNC.SQL

```
--  File:     IDXCUSNC.SQL
--            Microsoft TPC-C Benchmark Kit Ver. 4.00
--            Copyright Microsoft, 1996
--  Purpose:  Creates non-clustered index on customer table


use tpcc
go

declare @startdate datetime
declare @enddate datetime
select @startdate = getdate()
select "Start date:", convert(varchar(30),@startdate,9)

if exists ( select name from sysindexes where  name = 'customer_nc1' )
        drop index customer.customer_nc1

create unique nonclustered index customer_nc1 on customer(c_w_id, c_d_id,
c_last, c_first, c_id)
        on MSSQL70_cs_fg

select @enddate = getdate()
select "End date: ", convert(varchar(30),@enddate,9)
select "Elapsed time (in seconds): ", datediff(second, @startdate,
@enddate)

go
```

IDXDISCL.SQL

```
--  File:     IDXDISCL.SQL
--            Microsoft TPC-C Benchmark Kit Ver. 4.00
--            Copyright Microsoft, 1996
--  Purpose:  Creates clustered index on district table

use tpcc
go

declare @startdate datetime
declare @enddate datetime
select @startdate = getdate()
select "Start date:", convert(varchar(30),@startdate,9)

if exists ( select name from sysindexes where name = 'district_c1' )
        drop index district.district_c1

create unique clustered index  district_c1 on district(d_w_id, d_id)
         on MSSQL70_misc_fg

select @enddate = getdate()
select "End date: ", convert(varchar(30),@enddate,9)
select "Elapsed time (in seconds): ", datediff(second, @startdate,
@enddate)

go
```

IDXITMCL.SQL

```
--  File:     IDXITMCL.SQL
--            Microsoft TPC-C Benchmark Kit Ver. 4.00
--            Copyright Microsoft, 1996
--  Purpose:  Creates clustered index on item table


use tpcc
go

declare @startdate datetime
declare @enddate datetime
select @startdate = getdate()
select "Start date:", convert(varchar(30),@startdate,9)

if exists ( select name from sysindexes where  name = 'item_c1' )
        drop index item.item_c1

create unique clustered index item_c1 on item(i_id)
        on MSSQL70_misc_fg

select @enddate = getdate()
select "End date: ", convert(varchar(30),@enddate,9)
select "Elapsed time (in seconds): ", datediff(second, @startdate,
@enddate)

go
```

IDXNODCL.SQL

```
--  File:     IDXNODCL.SQL
--            Microsoft TPC-C Benchmark Kit Ver. 4.00
--            Copyright Microsoft, 1996
--  Purpose:  Creates clustered index on new_order table
```

```
use tpcc
go

declare @startdate datetime
declare @enddate datetime
select @startdate = getdate()
select "Start date:", convert(varchar(30),@startdate,9)

if exists ( select name from sysindexes where  name = 'new_order_c1' )
        drop index new_order.new_order_c1

create unique clustered index new_order_c1 on new_order(no_w_id, no_d_id,
no_o_id)
        on MSSQL70_misc_fg

select @enddate = getdate()
select "End date: ", convert(varchar(30),@enddate,9)
select "Elapsed time (in seconds): ", datediff(second, @startdate,
@enddate)

go
```

IDXODLCL.SQL

```
--  File:     IDXODLCL.SQL
--            Microsoft TPC-C Benchmark Kit Ver. 4.00
--            Copyright Microsoft, 1996
--  Purpose:  Creates clustered index on order_line table


use tpcc
go

declare @startdate datetime
declare @enddate datetime
select @startdate = getdate()
select "Start date:", convert(varchar(30),@startdate,9)

if exists ( select name from sysindexes where  name = 'order_line_c1' )
        drop index order_line.order_line_c1

create unique clustered index order_line_c1 on order_line(ol_w_id,
ol_d_id, ol_o_id, ol_number)
        on MSSQL70_misc_fg

select @enddate = getdate()
select "End date: ", convert(varchar(30),@enddate,9)
select "Elapsed time (in seconds): ", datediff(second, @startdate,
@enddate)

go
```

IDXORDCL.SQL

```
--  File:     IDXORDCL.SQL
--            Microsoft TPC-C Benchmark Kit Ver. 4.00
--            Copyright Microsoft, 1996
--  Purpose:  Creates clustered index on orders table


use tpcc
go

declare @startdate datetime
declare @enddate datetime
select @startdate = getdate()
select "Start date:", convert(varchar(30),@startdate,9)

if exists ( select name from sysindexes where  name = 'orders_c1' )
        drop index orders.orders_c1

create unique clustered index orders_c1 on orders(o_w_id, o_d_id, o_id)
        on MSSQL70_misc_fg

select @enddate = getdate()
select "End date: ", convert(varchar(30),@enddate,9)
select "Elapsed time (in seconds): ", datediff(second, @startdate,
@enddate)

go
```

IDXORDNC.SQL

```
--  File:     IDXORDNC.SQL
--            Microsoft TPC-C Benchmark Kit Ver. 4.00
--            Copyright Microsoft, 1996
--  Purpose:  Creates non-clustered index on orders table


use tpcc
go

declare @startdate datetime
declare @enddate datetime
select @startdate = getdate()
select "Start date:", convert(varchar(30),@startdate,9)

if exists ( select name from sysindexes where  name = 'orders_nc1' )
        drop index orders.orders_nc1

create unique nonclustered index orders_nc1 on orders(o_w_id, o_d_id,
o_c_id, o_id)
        on MSSQL70_misc_fg

select @enddate = getdate()
select "End date: ", convert(varchar(30),@enddate,9)
select "Elapsed time (in seconds): ", datediff(second, @startdate,
@enddate)
```

```
go
```

IDXSTKCL.SQL

```
--  File:     IDXSTKCL.SQL
--            Microsoft TPC-C Benchmark Kit Ver. 4.00
--            Copyright Microsoft, 1996
--  Purpose:  Creates clustered index on stock table


use tpcc
go

declare @startdate datetime
declare @enddate datetime
select @startdate = getdate()
select "Start date:", convert(varchar(30),@startdate,9)

if exists ( select name from sysindexes where  name = 'stock_c1' )
       drop index stock.stock_c1

create unique clustered index stock_c1 on stock(s_i_id, s_w_id)
       on MSSQL70_cs_fg

select @enddate = getdate()
select "End date: ", convert(varchar(30),@enddate,9)
select "Elapsed time (in seconds): ", datediff(second, @startdate,
@enddate)

go
```

IDXWARCL.SQL

```
--  File:     IDXWARCL.SQL
--            Microsoft TPC-C Benchmark Kit Ver. 4.00
--            Copyright Microsoft, 1996
--  Purpose:  Creates clustered index on warehouse table


use tpcc
go

declare @startdate datetime
declare @enddate datetime
select @startdate = getdate()
select "Start date:", convert(varchar(30),@startdate,9)

if exists ( select name from sysindexes where name = 'warehouse_c1' )
       drop index warehouse.warehouse_c1

create unique clustered index warehouse_c1 on warehouse(w_id)
       on MSSQL70_misc_fg

select @enddate = getdate()
select "End date: ", convert(varchar(30),@enddate,9)
select "Elapsed time (in seconds): ", datediff(second, @startdate,
@enddate)

go
```

RESTORE.SQL

```
--  File:     RESTORE.SQL
--            Microsoft TPC-C Benchmark Kit Ver. 4.00
--            Copyright Microsoft, 1996
--  Purpose:  Loads database backup from backup files


declare @startdate datetime
declare @enddate datetime
select @startdate = getdate()
select "Start date:", convert(varchar(30),@startdate,9)

restore database tpcc from tpccback1, tpccback2, tpccback3,
                          tpccback4, tpccback5, tpccback6 with replace,
                           stats = 5

select @enddate = getdate()
select "End date: ", convert(varchar(30),@enddate,9)
select "Elapsed time (in seconds): ", datediff(second, @startdate,
@enddate)

go
```

TABLES .SQL

```
--  File:     TABLES.SQL
--            Microsoft TPC-C Benchmark Kit Ver. 4.00
--            Copyright Microsoft, 1996
--  Purpose:  Creates TPC-C tables


use tpcc
go

if exists ( select name from sysobjects where name = 'warehouse' )
       drop table warehouse
go
create table warehouse
(
       w_id                          smallint,
       w_name                        char(10),
       w_street_1                    char(20),
       w_street_2                    char(20),
       w_city                        char(20),
       w_state                       char(2),
       w_zip                         char(9),
       w_tax                         numeric(4,4),
       w_ytd                         numeric(12,2)
) on MSSQL70_misc_fg
go

if exists ( select name from sysobjects where name = 'district' )
       drop table district
go
```

```
create table district
(
        d_id                            tinyint,
        d_w_id                          smallint,
        d_name                          char(10),
        d_street_1                      char(20),
        d_street_2                      char(20),
        d_city                          char(20),
        d_state                         char(2),
        d_zip                           char(9),
        d_tax                           numeric(4,4),
        d_ytd                           numeric(12,2),
        d_next_o_id                     int
) on MSSQL70_misc_fg
go

if exists ( select name from sysobjects where name = 'customer' )
        drop table customer
go
create table customer
(
        c_id                            int,
        c_d_id                          tinyint,
        c_w_id                          smallint,
        c_first                         char(16),
        c_middle                        char(2),
        c_last                          char(16),
        c_street_1                      char(20),
        c_street_2                      char(20),
        c_city                          char(20),
        c_state                         char(2),
        c_zip                           char(9),
        c_phone                         char(16),
        c_since                         datetime,
        c_credit                        char(2),
        c_credit_lim            numeric(12,2),
        c_discount                      numeric(4,4),
        c_balance                       numeric(12,2),
        c_ytd_payment           numeric(12,2),
        c_payment_cnt           smallint,
        c_delivery_cnt          smallint,
        c_data                          char(500)
) on MSSQL70_cs_fg
go

if exists ( select name from sysobjects where name = 'history' )
        drop table history
go
create table history
(
        h_c_id                          int,
        h_c_d_id                        tinyint,
        h_c_w_id                        smallint,
        h_d_id                          tinyint,
        h_w_id                          smallint,
        h_date                          datetime,
        h_amount                        numeric(6,2),
        h_data                          char(24)
) on MSSQL70_misc_fg
go
```

```
if exists ( select name from sysobjects where name = 'new_order' )
        drop table new_order
go
create table new_order
(
        no_o_id                         int,
        no_d_id                         tinyint,
        no_w_id                         smallint
) on MSSQL70_misc_fg
go

if exists ( select name from sysobjects where name = 'orders' )
        drop table orders
go
create table orders
(
        o_id                            int,
        o_d_id                          tinyint,
        o_w_id                          smallint,
        o_c_id                          int,
        o_entry_d                       datetime,
        o_carrier_id            tinyint,
        o_ol_cnt                        tinyint,
        o_all_local                     tinyint
) on MSSQL70_misc_fg
go

if exists ( select name from sysobjects where name = 'order_line' )
        drop table order_line
go
create table order_line
(
        ol_o_id                         int,
        ol_d_id                         tinyint,
        ol_w_id                         smallint,
        ol_number                       tinyint,
        ol_i_id                         int,
        ol_supply_w_id          smallint,
        ol_delivery_d           datetime,
        ol_quantity                     smallint,
        ol_amount                       numeric(6,2),
        ol_dist_info            char(24)
) on MSSQL70_misc_fg
go

if exists ( select name from sysobjects where name = 'item' )
        drop table item
go
create table item
(
        i_id                            int,
        i_im_id                         int,
        i_name                          char(24),
        i_price                         numeric(5,2),
        i_data                          char(50)
) on MSSQL70_misc_fg
go

if exists ( select name from sysobjects where name = 'stock' )
        drop table stock
go
```

```
create table stock
(
        s_i_id                          int,
        s_w_id                          smallint,
        s_quantity                      smallint,
        s_dist_01                       char(24),
        s_dist_02                       char(24),
        s_dist_03                       char(24),
        s_dist_04                       char(24),
        s_dist_05                       char(24),
        s_dist_06                       char(24),
        s_dist_07                       char(24),
        s_dist_08                       char(24),
        s_dist_09                       char(24),
        s_dist_10                       char(24),
        s_ytd                           int,
        s_order_cnt                     smallint,
        s_remote_cnt            smallint,
        s_data                          char(50)
) on MSSQL70_cs_fg
go
```

VERIFYTPCCLOAD

```
use tpcc
print 'WAREHOUSE'
select rows from sysindexes where id=object_id("warehouse")
print 'DISTRICT = (10 * No of warehouses)'
select rows from sysindexes where id=object_id("district")
print 'ITEM = 100,000'
select rows from sysindexes where id=object_id("item")
print 'CUSTOMER = (30,000 * No of warehouses)'
select rows from sysindexes where id=object_id("customer")
print 'ORDERS = (30,000 * No of warehouses)'
select rows from sysindexes where id=object_id("orders")
print 'HISTORY = (30,000 * No of warehouses)'
select rows from sysindexes where id=object_id("history")
print 'STOCK = (100,000 * No of warehouses)'
select rows from sysindexes where id=object_id("stock")
print 'ORDER_LINE = (300,000 * No of warehouses + some change)'
select rows from sysindexes where id=object_id("order_line")
print 'NEW_ORDER = (9000 * No of warehouses)'
select rows from sysindexes where id=object_id("new_order")
print '**************Index Check****************'
use tpcc
go
sp_helpindex customer
go
sp_helpindex stock
go
sp_helpindex district
go
sp_helpindex item
go
sp_helpindex new_order
go
sp_helpindex orders
go
sp_helpindex order_line
go
sp_helpindex warehouse
go
```

Stored Procedures

DELIVERY.SQL

```
--  File:     DELIVERY.SQL
--            Microsoft TPC-C Benchmark Kit Ver. 4.00
--            Copyright Microsoft, 1996
--  Purpose:  Creates delivery transaction stored procedure


use tpcc
go

if exists (select name from sysobjects where name = "tpcc_delivery" )
        drop procedure tpcc_delivery
go

create proc tpcc_delivery     @w_id           smallint,

                                              @o_carrier_id   smallint
as

declare @d_id tinyint,
        @o_id int,
        @c_id int,
        @total numeric(12,2),
        @oid1 int,
        @oid2 int,
        @oid3 int,
        @oid4 int,
        @oid5 int,
        @oid6 int,
        @oid7 int,
        @oid8 int,
        @oid9 int,
        @oid10 int

select @d_id = 0

begin tran d

    while (@d_id < 10)
    begin

        select @d_id  = @d_id + 1,
               @total = 0,
               @o_id  = 0

               select top 1 @o_id = no_o_id
               from new_order (serializable updlock)
        where no_w_id = @w_id and
                     no_d_id = @d_id
               order by no_o_id asc
```

```
        if (@@rowcount <> 0)
        begin

--  claim the order for this district

            delete new_order
            where no_w_id = @w_id and
                        no_d_id = @d_id and
                           no_o_id = @o_id

--  set carrier_id on this order (and get customer id)

            update orders
                   set o_carrier_id = @o_carrier_id,
                @c_id        = o_c_id
            where o_w_id = @w_id and
                        o_d_id = @d_id and
                           o_id   = @o_id

--  set date in all lineitems for this order (and sum amounts)

            update order_line
                   set ol_delivery_d = getdate(),
                    @total        = @total + ol_amount
            where ol_w_id = @w_id and
                  ol_d_id = @d_id and
                         ol_o_id = @o_id

--  accummulate lineitem amounts for this order into customer

                   update customer
                      set c_balance      = c_balance + @total,
                          c_delivery_cnt = c_delivery_cnt + 1

            where c_w_id = @w_id and
                        c_d_id = @d_id and
                           c_id   = @c_id

        end

        select @oid1 = case @d_id when  1  then @o_id else @oid1 end,
               @oid2 = case @d_id when  2  then @o_id else @oid2 end,
               @oid3 = case @d_id when  3  then @o_id else @oid3 end,
               @oid4 = case @d_id when  4  then @o_id else @oid4 end,
               @oid5 = case @d_id when  5  then @o_id else @oid5 end,
               @oid6 = case @d_id when  6  then @o_id else @oid6 end,
               @oid7 = case @d_id when  7  then @o_id else @oid7 end,
               @oid8 = case @d_id when  8  then @o_id else @oid8 end,
               @oid9 = case @d_id when  9  then @o_id else @oid9 end,
               @oid10 = case @d_id when 10 then @o_id else @oid10 end

    end

commit tran d

-- return delivery data to client

select @oid1,
       @oid2,
       @oid3,
       @oid4,
       @oid5,
       @oid6,
       @oid7,
       @oid8,
       @oid9,
       @oid10

go
```

NEWORD.SQL

```
--  File:     NEWORD.SQL
--            Microsoft TPC-C Benchmark Kit Ver. 4.00
--            Copyright Microsoft, 1996
--  Purpose:  Creates new order transaction stored procedure
--
--  Modified 9/21/98 - Jamie Reding - Microsoft Corporation
--             Reordered @rowcount check so that invalid supply warehouse
id,
--      as well as invalid item id, is detected and causes explicit
--             transaction rollback.
--

use tpcc
go

if exists ( select name from sysobjects where name = "tpcc_neworder" )
        drop procedure tpcc_neworder
go

create proc tpcc_neworder
                                        @w_id           smallint,
                                        @d_id           tinyint,
                                        @c_id           int,
                                        @o_ol_cnt       tinyint,
                                        @o_all_local    tinyint,
                                        @i_id1  int = 0, @s_w_id1 smallint =
0, @ol_qty1 smallint = 0,
                                        @i_id2  int = 0, @s_w_id2 smallint =
0, @ol_qty2 smallint = 0,
                                        @i_id3  int = 0, @s_w_id3 smallint =
0, @ol_qty3 smallint = 0,
                                        @i_id4  int = 0, @s_w_id4 smallint =
0, @ol_qty4 smallint = 0,
                                        @i_id5  int = 0, @s_w_id5 smallint =
0, @ol_qty5 smallint = 0,
                                        @i_id6  int = 0, @s_w_id6 smallint =
0, @ol_qty6 smallint = 0,
                                        @i_id7  int = 0, @s_w_id7 smallint =
0, @ol_qty7 smallint = 0,
                                        @i_id8  int = 0, @s_w_id8 smallint =
0, @ol_qty8 smallint = 0,
                                        @i_id9  int = 0, @s_w_id9 smallint =
0, @ol_qty9 smallint = 0,
                                        @i_id10 int = 0, @s_w_id10 smallint
= 0, @ol_qty10 smallint = 0,
                                        @i_id11 int = 0, @s_w_id11 smallint
= 0, @ol_qty11 smallint = 0,
```

```
                                        @i_id12 int = 0, @s_w_id12 smallint
= 0, @ol_qty12 smallint = 0,
                                        @i_id13 int = 0, @s_w_id13 smallint
= 0, @ol_qty13 smallint = 0,
                                        @i_id14 int = 0, @s_w_id14 smallint
= 0, @ol_qty14 smallint = 0,
                                        @i_id15 int = 0, @s_w_id15 smallint
= 0, @ol_qty15 smallint = 0


as
declare @w_tax          numeric(4,4),
        @d_tax          numeric(4,4),
        @c_last         char(16),
        @c_credit       char(2),
        @c_discount     numeric(4,4),
        @i_price        numeric(5,2),
        @i_name         char(24),
        @i_data         char(50),
        @o_entry_d      datetime,
        @remote_flag    int,
        @s_quantity     smallint,
        @s_data         char(50),
        @s_dist         char(24),
               @li_no          int,
               @o_id                   int,
               @commit_flag    tinyint,
        @li_id          int,
        @li_s_w_id      smallint,
        @li_qty         smallint,
               @ol_number              int,
               @c_id_local             int

begin

        begin transaction n

--  get district tax and next availible order id and update
--  plus initialize local variables

        update  district
        set             @d_tax       = d_tax,
                        @o_id        = d_next_o_id,
                        d_next_o_id  = d_next_o_id + 1,
                        @o_entry_d   = getdate(),
                        @li_no       = 0,
                        @commit_flag = 1
        where   d_w_id       = @w_id and
                        d_id         = @d_id

--  process orderlines

    while (@li_no < @o_ol_cnt)
       begin

        select @li_no = @li_no + 1

--  set i_id, s_w_id, and qty for this lineitem

           select @li_id = case @li_no
                  when 1 then @i_id1
                  when 2 then @i_id2
                  when 3 then @i_id3
                  when 4 then @i_id4
                  when 5 then @i_id5
                  when 6 then @i_id6
                  when 7 then @i_id7
                  when 8 then @i_id8
                  when 9 then @i_id9
                  when 10 then @i_id10
                  when 11 then @i_id11
                  when 12 then @i_id12
                  when 13 then @i_id13
                  when 14 then @i_id14
                  when 15 then @i_id15
                  end,

                  @li_s_w_id = case @li_no
                  when 1 then @s_w_id1
                  when 2 then @s_w_id2
                  when 3 then @s_w_id3
                  when 4 then @s_w_id4
                  when 5 then @s_w_id5
                  when 6 then @s_w_id6
                  when 7 then @s_w_id7
                  when 8 then @s_w_id8
                  when 9 then @s_w_id9
                  when 10 then @s_w_id10
                  when 11 then @s_w_id11
                  when 12 then @s_w_id12
                  when 13 then @s_w_id13
                  when 14 then @s_w_id14
                  when 15 then @s_w_id15
                  end,

                  @li_qty = case  @li_no
                  when 1 then @ol_qty1
                  when 2 then @ol_qty2
                  when 3 then @ol_qty3
                  when 4 then @ol_qty4
                  when 5 then @ol_qty5
                  when 6 then @ol_qty6
                  when 7 then @ol_qty7
                  when 8 then @ol_qty8
                  when 9 then @ol_qty9
                  when 10 then @ol_qty10
                  when 11 then @ol_qty11
                  when 12 then @ol_qty12
                  when 13 then @ol_qty13
                  when 14 then @ol_qty14
                  when 15 then @ol_qty15
                  end

--  get item data (no one updates item)

               select  @i_price = i_price,
                               @i_name  = i_name,
                               @i_data  = i_data
               from    item (tablock repeatableread)
               where   i_id = @li_id

--  update stock values
```

```
            update  stock
            set             s_ytd           = s_ytd + @li_qty,
                            @s_quantity  = s_quantity   = s_quantity -
@li_qty +

                      case when (s_quantity - @li_qty < 10) then 91 else
0 end,
                            s_order_cnt  = s_order_cnt + 1,
                            s_remote_cnt = s_remote_cnt +
                                                                    case
when (@li_s_w_id = @w_id) then 0 else 1 end,
                            @s_data      = s_data,
                            @s_dist      = case @d_id
                                                          when 1  then
s_dist_01
                                          when 2  then s_dist_02
                                          when 3  then s_dist_03
                                          when 4  then s_dist_04
                                          when 5  then s_dist_05
                                          when 6  then s_dist_06
                                          when 7  then s_dist_07
                                          when 8  then s_dist_08
                                          when 9  then s_dist_09
                                          when 10 then s_dist_10
                                    end
            where   s_i_id          = @li_id and
                        s_w_id              = @li_s_w_id

--  if there actually is a stock (and item) with these ids, go to work

          if (@@rowcount > 0)
                    begin

--  insert order_line data (using data from item and stock)

                            insert into order_line values(@o_id,

              @d_id,

              @w_id,

              @li_no,

              @li_id,

              @li_s_w_id,

              "dec 31, 1899",

              @li_qty,

              @i_price * @li_qty,

              @s_dist)


--  send line-item data to client

                            select  @i_name,
                                        @s_quantity,
                                                          b_g = case when (
(patindex("%ORIGINAL%",@i_data) > 0) and

         (patindex("%ORIGINAL%",@s_data) > 0) )
                                                                  then "B" else "G"
end,
                                                          @i_price,
                                                          @i_price * @li_qty

                        end
        else
                begin

--  no item (or stock) found - triggers rollback condition


                        select "",0,"",0,0
                        select @commit_flag = 0

                end
        end

--  get customer last name, discount, and credit rating

    select      @c_last     = c_last,
                        @c_discount = c_discount,
                        @c_credit   = c_credit,
                        @c_id_local = c_id
    from        customer (repeatableread)
    where       c_id            = @c_id and
                        c_w_id          = @w_id and
                        c_d_id          = @d_id

--  insert fresh row into orders table

    insert into orders values (@o_id,
                                    @d_id,
                                       @w_id,
                                               @c_id_local,
                                               @o_entry_d,
                                                   0,
                                                   @o_ol_cnt,
                                                   @o_all_local)

--  insert corresponding row into new-order table

        insert into new_order values (@o_id,
                                                                        @d_id,
                                                                        @w_id)

--  select warehouse tax

        select  @w_tax  = w_tax
        from    warehouse (repeatableread)
        where   w_id    = @w_id

        if (@commit_flag = 1)
                commit transaction n
        else

--  all that work for nuthin!!!
```

```
                rollback transaction n

--  return order data to client

        select @w_tax,
               @d_tax,
                   @o_id,
                   @c_last,
                   @c_discount,
                   @c_credit,
                   @o_entry_d,
                   @commit_flag

end

go
```

ORDSTAT.SQL

```
--  File:     ORDSTAT.SQL
--            Microsoft TPC-C Benchmark Kit Ver. 4.00
--            Copyright Microsoft, 1996
--  Purpose:  Creates order status transaction stored procedure


use tpcc
go

if exists ( select name from sysobjects where name = "tpcc_orderstatus" )
        drop procedure   tpcc_orderstatus
go

create proc tpcc_orderstatus @w_id           smallint,
                                                    @d_id
        tinyint,
                                                    @c_id         int,
                                                    @c_last
        char(16) = ""

as

declare @c_balance            numeric(12,2),
        @c_first              char(16),
        @c_middle             char(2),
        @o_id                 int,
        @o_entry_d            datetime,
        @o_carrier_id  smallint,
        @cnt                  smallint

begin tran o

        if (@c_id = 0)
                begin

--  get customer id and info using last name

                select @cnt = (count(*)+1)/2
                from customer (repeatableread)
                where c_last = @c_last and
                  c_w_id = @w_id and
                  c_d_id = @d_id

                set rowcount @cnt

                select @c_id = c_id,
                           @c_balance = c_balance,
                           @c_first   = c_first,
                           @c_last    = c_last,
                           @c_middle  = c_middle
                from customer (repeatableread)
                where c_last = @c_last and
                  c_w_id = @w_id and
                  c_d_id = @d_id
                order by c_w_id, c_d_id, c_last, c_first

                set rowcount 0
                end

        else
                begin

--  get customer info if by id

                select @c_balance = c_balance,
                       @c_first   = c_first,
                       @c_middle  = c_middle,
                       @c_last    = c_last
                from customer (repeatableread)
                where c_id   = @c_id and
                      c_d_id = @d_id and
                      c_w_id = @w_id

                select @cnt = @@rowcount

                end

--  if no such customer

        if (@cnt = 0)
        begin
                raiserror("Customer not found",18,1)
                goto custnotfound
        end

--  get order info

        select @o_id = o_id,
                   @o_entry_d    = o_entry_d,
           @o_carrier_id = o_carrier_id
        from orders (serializable)
        where o_c_id = @c_id and
          o_d_id = @d_id and
          o_w_id = @w_id
        order by o_id asc

--  select order lines for the current order

        select ol_supply_w_id,
           ol_i_id,
               ol_quantity,
```

```
                ol_amount,
                ol_delivery_d
        from order_line (repeatableread)
        where ol_o_id = @o_id and
              ol_d_id = @d_id and
              ol_w_id = @w_id

custnotfound:

commit tran o

--  return data to client

select @c_id,
          @c_last,
          @c_first,
          @c_middle,
          @o_entry_d,
          @o_carrier_id,
          @c_balance,
          @o_id

go
```

PAYMENTS.SQL

```
--  File:     PAYMENT.SQL
--            Microsoft TPC-C Benchmark Kit Ver. 4.00
--            Copyright Microsoft, 1996
--  Purpose:  Creates payment transaction stored procedure


use tpcc
go

if exists (select name from sysobjects where name = "tpcc_payment" )
       drop procedure tpcc_payment
go

create proc tpcc_payment @w_id           smallint,
                                         @c_w_id         smallint,
                                         @h_amount
numeric(6,2),
                                         @d_id           tinyint,
                                         @c_d_id         tinyint,
                                         @c_id           int,
                                         @c_last         char(16) =
""


as
declare  @w_street_1     char(20),
         @w_street_2     char(20),
         @w_city         char(20),
         @w_state        char(2),
         @w_zip          char(9),
         @w_name         char(10),
         @d_street_1     char(20),
         @d_street_2     char(20),
         @d_city         char(20),
         @d_state        char(2),
         @d_zip          char(9),
         @d_name         char(10),
         @c_first        char(16),
         @c_middle       char(2),
         @c_street_1     char(20),
         @c_street_2     char(20),
         @c_city         char(20),
         @c_state        char(2),
         @c_zip          char(9),
         @c_phone        char(16),
         @c_since        datetime,
         @c_credit       char(2),
         @c_credit_lim   numeric(12,2),
         @c_balance      numeric(12,2),
         @c_discount     numeric(4,4),
         @data           char(500),
         @c_data         char(500),
         @datetime       datetime,
         @w_ytd          numeric(12,2),
         @d_ytd          numeric(12,2),
         @cnt            smallint,
         @val            smallint,
         @screen_data   char(200),
                @d_id_local    tinyint,
                @w_id_local    smallint,
                @c_id_local    int

select @screen_data = ""

begin tran p

--  get payment date

       select @datetime = getdate()

       if (@c_id = 0)
       begin

--  get customer id and info using last name

               select @cnt = count(*)
               from customer (repeatableread)
               where c_last = @c_last and
                     c_w_id = @c_w_id and
                     c_d_id = @c_d_id


               select @val = (@cnt + 1) / 2
               set rowcount @val

               select @c_id = c_id
               from customer (repeatableread)
               where c_last = @c_last and
                     c_w_id = @c_w_id and
                     c_d_id = @c_d_id
               order by c_last, c_first

               set rowcount 0
       end
```

```
--  get customer info and update balances

        update customer set
               @c_balance     = c_balance = c_balance - @h_amount,
               c_payment_cnt  = c_payment_cnt + 1,
               c_ytd_payment  = c_ytd_payment + @h_amount,
               @c_first       = c_first,
               @c_middle      = c_middle,
            @c_last        = c_last,
            @c_street_1    = c_street_1,
               @c_street_2    = c_street_2,
               @c_city        = c_city,
               @c_state       = c_state,
               @c_zip         = c_zip,
               @c_phone       = c_phone,
               @c_credit      = c_credit,
               @c_credit_lim  = c_credit_lim,
               @c_discount    = c_discount,
               @c_since       = c_since,
               @data          = c_data,
               @c_id_local    = c_id
        where c_id   = @c_id and
              c_w_id = @c_w_id and
              c_d_id = @c_d_id

--  if customer has bad credit get some more info

        if (@c_credit = "BC")
        begin

--      compute new info

               select @c_data = convert(char(5),@c_id) +
                                        convert(char(4),@c_d_id) +
                                   convert(char(5),@c_w_id) +
                                   convert(char(4),@d_id) +
                                   convert(char(5),@w_id) +
                                   convert(char(19),@h_amount) +
                                   substring(@data, 1, 458)

--  update customer info

               update customer set
                      c_data = @c_data
               where c_id   = @c_id and
                        c_w_id = @c_w_id and
                     c_d_id = @c_d_id

               select @screen_data = substring (@c_data,1,200)
        end

--  get district data and update year-to-date

        update district
        set d_ytd       = d_ytd + @h_amount,
               @d_street_1 = d_street_1,
               @d_street_2 = d_street_2,
               @d_city     = d_city,
               @d_state    = d_state,
               @d_zip      = d_zip,
               @d_name     = d_name,
                  @d_id_local = d_id
           where d_w_id = @w_id and
                 d_id   = @d_id

--  get warehouse data and update year-to-date

           update warehouse
           set w_ytd       = w_ytd + @h_amount,
                  @w_street_1 = w_street_1,
               @w_street_2 = w_street_2,
               @w_city     = w_city,
               @w_state    = w_state,
               @w_zip      = w_zip,
               @w_name     = w_name,
                  @w_id_local = w_id
           where w_id = @w_id

--  create history record

           insert into history values  (@c_id_local,
                                                                   @c_d_id,
                                              @c_w_id,
                                              @d_id_local,
                                              @w_id_local,
                                              @datetime,
                                              @h_amount,
                                              @w_name + "
" + @d_name)

commit tran p

--  return data to client

select  @c_id,
                  @c_last,
                  @datetime,
                  @w_street_1,
                  @w_street_2,
                  @w_city,
                  @w_state,
                  @w_zip,
                  @d_street_1,
                  @d_street_2,
                  @d_city,
                  @d_state,
                  @d_zip,
                  @c_first,
                  @c_middle,
                  @c_street_1,
                  @c_street_2,
                  @c_city,
                  @c_state,
                  @c_zip,
                  @c_phone,
                  @c_since,
                  @c_credit,
                  @c_credit_lim,
                  @c_discount,
                  @c_balance,
                  @screen_data
```

```
go
```

STOCKLEV.SQL

```
--  File:     STOCKLEV.SQL
--            Microsoft TPC-C Benchmark Kit Ver. 4.00
--            Copyright Microsoft, 1996
--  Purpose:  Creates stock level transaction stored procedure


use tpcc
go

if exists (select name from sysobjects where name = "tpcc_stocklevel" )
       drop procedure tpcc_stocklevel
go

create proc tpcc_stocklevel   @w_id          smallint,
                                             @d_id          tinyint,
                                             @threshhold    smallint
as

       declare @o_id_low int,
                  @o_id_high int

    select @o_id_low  = (d_next_o_id - 20),
              @o_id_high = (d_next_o_id - 1)
    from district
    where d_w_id = @w_id and
                d_id   = @d_id

    select count(distinct(s_i_id))
       from  stock, order_line
    where ol_w_id    =  @w_id and
             ol_d_id    =  @d_id and
             ol_o_id between @o_id_low and @o_id_high and
          s_w_id     =  ol_w_id and
             s_i_id     =  ol_i_id and
             s_quantity <  @threshhold

go
```

Loader Source

GETARGS.C

```
//      File:           GETARGS.C
//                              Microsoft TPC-C Kit Ver. 4.00
//                              Copyright Microsoft, 1996, 1997, 1998
//      Purpose:        Source file for command line processing


// Includes
#include "tpcc.h"

//===========================================================================
//
// Function name: GetArgsLoader
//
//===========================================================================

void GetArgsLoader(int argc, char **argv, TPCCLDR_ARGS *pargs)
{
    int        i;
    char       *ptr;

#ifdef DEBUG
    printf("[%ld]DBG: Entering GetArgsLoader()\n", (int)
GetCurrentThreadId());
#endif

    /* init args struct with some useful values */
    pargs->server                       =  SERVER;
    pargs->user                         =  USER;
    pargs->password                     =  PASSWORD;
    pargs->database                     =  DATABASE;
    pargs->batch                        =  BATCH;
    pargs->num_warehouses               =  UNDEF;
       pargs->tables_all                        =  TRUE;
       pargs->table_item                        =  FALSE;
       pargs->table_warehouse           =  FALSE;
       pargs->table_customer            =  FALSE;
       pargs->table_orders                      =  FALSE;
       pargs->loader_res_file                   =  LOADER_RES_FILE;
       pargs->pack_size                         =  DEFLDPACKSIZE;
       pargs->starting_warehouse        =  DEF_STARTING_WAREHOUSE;
       pargs->build_index                       =  BUILD_INDEX;
       pargs->index_order                       =  INDEX_ORDER;
       pargs->index_script_path         =  INDEX_SCRIPT_PATH;
       pargs->scale_down                        =  SCALE_DOWN;

    /* check for zero command line args */
    if ( argc == 1 )
               GetArgsLoaderUsage();

    for (i = 1; i < argc; ++i)
    {
               if (argv[i][0] != '-' && argv[i][0] != '/')
               {
               printf("\nUnrecognized command");
               GetArgsLoaderUsage();
               exit(1);
               }

               ptr = argv[i];

               switch (ptr[1])
               {
               case 'h':     /* Fall throught */
               case 'H':
                              GetArgsLoaderUsage();
                              break;

               case 'D':
                              pargs->database = ptr+2;
```

```
                        break;

                case 'P':
                        pargs->password = ptr+2;
                        break;

                case 'S':
                        pargs->server = ptr+2;
                        break;

                case 'U':
                        pargs->user = ptr+2;
                        break;

                case 'b':
                        pargs->batch = atol(ptr+2);
                        break;

                case 'W':
                        pargs->num_warehouses = atol(ptr+2);
                        break;

                case 's':
                        pargs->starting_warehouse = atol(ptr+2);
                        break;

                case 't':
                        {
                                pargs->tables_all = FALSE;
                                if (strcmp(ptr+2,"item") == 0)
                                        pargs->table_item = TRUE;
                                else if (strcmp(ptr+2,"warehouse")
== 0)
                                        pargs->table_warehouse =
TRUE;
                                else if (strcmp(ptr+2,"customer") ==
0)
                                        pargs->table_customer = TRUE;
                                else if (strcmp(ptr+2,"orders") ==
0)
                                        pargs->table_orders = TRUE;
                                else
                                {
                                printf("\nUnrecognized command");
                                GetArgsLoaderUsage();
                                exit(1);
                                }

                                break;
                        }

                case 'f':
                        pargs->loader_res_file = ptr+2;
                        break;

                case 'p':
                        pargs->pack_size = atol(ptr+2);
                        break;

                case 'i':
                        pargs->build_index = atol(ptr+2);
                        break;

                case 'o':
                        pargs->index_order = atol(ptr+2);
                        break;

                case 'c':
                        pargs->scale_down = atol(ptr+2);
                        break;

                case 'd':
                        pargs->index_script_path = ptr+2;
                        break;

                default:
                        GetArgsLoaderUsage();
                        exit(-1);
                        break;
                }
        }

        /* check for required args */
        if (pargs->num_warehouses == UNDEF )
        {
                printf("Number of Warehouses is required\n");
                exit(-2);
        }

        return;
}


//==============================================================================
//
// Function name: GetArgsLoaderUsage
//
//==============================================================================

void GetArgsLoaderUsage()
{

#ifdef DEBUG
    printf("[%ld]DBG: Entering GetArgsLoaderUsage()\n", (int)
GetCurrentThreadId());
#endif


    printf("TPCCLDR:\n\n");
        printf("Parameter
Default\n");
        printf("-------------------------------------------------------
----\n");
    printf("-W Number of Warehouses to Load                         Required
\n");
    printf("-S Server                                               %s\n",
SERVER);
    printf("-U Username                                             %s\n",
USER);
    printf("-P Password                                             %s\n",
PASSWORD);
```

```
    printf("-D Database                                          %s\n",
DATABASE);
        printf("-b Batch Size
%ld\n", (long) BATCH);
        printf("-p TDS packet size
%ld\n", (long) DEFLDPACKSIZE);
        printf("-f Loader Results Output Filename
%s\n", LOADER_RES_FILE);
        printf("-s Starting Warehouse
%ld\n", (long) DEF_STARTING_WAREHOUSE);
        printf("-i Build Option (data = 0, data and index = 1)
%ld\n", (long) BUILD_INDEX);
        printf("-o Cluster Index Build Order (before = 1, after = 0)
%ld\n", (long) INDEX_ORDER);
        printf("-c Build Scaled Database (normal = 0, tiny = 1)
%ld\n", (long) SCALE_DOWN);
        printf("-d Index Script Path
%s\n", INDEX_SCRIPT_PATH);
        printf("-t Table to Load                                  all
tables \n");
    printf("   [item|warehouse|customer|orders]\n");
    printf("   Notes: \n");
    printf("     - the '-t' parameter may be included multiple times to
\n");
    printf("       specify multiple tables to be loaded \n");
    printf("     - 'item' loads ITEM table \n");
    printf("     - 'warehouse' loads WAREHOUSE, DISTRICT, and STOCK tables
\n");
    printf("     - 'customer' loads CUSTOMER and HISTORY tables \n");
    printf("     - 'orders' load NEW-ORDER, ORDERS, ORDER-LINE tables
\n");

        printf("\nNote:  Command line switches are case sensitive.\n");

    exit(0);
}
```

RANDOM.C

```
//      File:           RANDOM.C
//                              Microsoft TPC-C Kit Ver. 4.00
//                              Copyright Microsoft, 1996, 1997, 1998
//      Purpose:        Random number generation routines for database
loader


// Includes
#include "tpcc.h"
#include "math.h"

// Defines
#define A            16807
#define M       2147483647
#define Q           127773      /* M div A */
#define R             2836      /* M mod A */
#define Thread        __declspec(thread)

// Globals
long    Thread Seed = 0;        /* thread local seed */

/************************************************************************
*****
*
*
* random -
*
*       Implements a GOOD pseudo random number generator.  This generator
*
*       will/should? run the complete period before repeating.
*
*
*
* Copied from:
*
*       Random Numbers Generators: Good Ones Are Hard to Find.
*
*       Communications of the ACM - October 1988 Volume 31 Number 10
*
*
*
* Machine Dependencies:
*
*       long must be 2 ^ 31 - 1 or greater.
*
*
*
************************************************************************
****/

/************************************************************************
*****
* seed - load the Seed value used in irand and drand.  Should be used
before  *
*       first call to irand or drand.
*
************************************************************************
****/

void seed(long val)
{

#ifdef DEBUG
    printf("[%ld]DBG: Entering seed()...\n", (int) GetCurrentThreadId());
        printf("Old Seed %ld New Seed %ld\n",Seed, val);
#endif

    if ( val < 0 )
            val = abs(val);

    Seed = val;

}


/************************************************************************
****
*
*
```

```
* irand - returns a 32 bit integer pseudo random number with a period of
*
*       1 to 2 ^ 32 - 1.
*
*
*
* parameters:
*
*       none.
*
*
*
* returns:
*
*       32 bit integer - defined as long ( see above ).
*
*
*
* side effects:
*
*       seed get recomputed.
*
*******************************************************************************
***/

long irand()
{
    register long    s;      /* copy of seed */
    register long    test;   /* test flag */
    register long    hi;     /* tmp value for speed */
    register long    lo;     /* tmp value for speed */

#ifdef DEBUG
    printf("[%ld]DBG: Entering irand()...\n", (int) GetCurrentThreadId());
#endif

    s = Seed;
    hi = s / Q;
    lo = s % Q;

    test = A * lo - R * hi;
    if ( test > 0 )
                Seed = test;
    else
                Seed = test + M;

    return( Seed );
}


/*******************************************************************************
****
*
* drand - returns a double pseudo random number between 0.0 and 1.0.
*
*       See irand.
*
*******************************************************************************
***/
double drand()
{

#ifdef DEBUG
    printf("[%ld]DBG: Entering drand()...\n", (int) GetCurrentThreadId());
#endif

    return( (double)irand() / 2147483647.0);
}


//============================================================================
// Function   : RandomNumber
//
// Description:
//============================================================================
long RandomNumber(long lower, long upper)
{
    long rand_num;

#ifdef DEBUG
    printf("[%ld]DBG: Entering RandomNumber()...\n", (int)
GetCurrentThreadId());
#endif

        if ( upper == lower )  /* pgd 08-13-96 perf enhancement */
                return lower;

        upper++;

    if ( upper <= lower )
                rand_num = upper;
    else
                rand_num = lower + irand() % (upper - lower); /* pgd 08-13-
96 perf enhancement */


#ifdef DEBUG
    printf("[%ld]DBG: RandomNumber between %ld & %ld ==> %ld\n",
                                (int) GetCurrentThreadId(), lower, upper,
rand_num);
#endif


    return rand_num;
}


#if 0

//Orginal code pgd 08/13/96

long RandomNumber(long lower,
                                  long upper)
{
    long rand_num;

#ifdef DEBUG
    printf("[%ld]DBG: Entering RandomNumber()...\n", (int)
GetCurrentThreadId());
#endif
```

```
        upper++;

    if ((upper <= lower))
                rand_num = upper;
    else
                rand_num = lower + irand() % ((upper > lower) ? upper -
lower : upper);


#ifdef DEBUG
    printf("[%ld]DBG: RandomNumber between %ld & %ld ==> %ld\n",
                            (int) GetCurrentThreadId(), lower, upper,
rand_num);
#endif


    return rand_num;
}
#endif

//==============================================================================
// Function   : NURand
//
// Description:
//==============================================================================
long NURand(int iConst,
            long x,
            long y,
            long C)
{
    long rand_num;

#ifdef DEBUG
    printf("[%ld]DBG: Entering NURand()...\n", (int)
GetCurrentThreadId());
#endif

    rand_num = (((RandomNumber(0,iConst) | RandomNumber(x,y)) + C) % (y-
x+1))+x;

#ifdef DEBUG
    printf("[%ld]DBG: NURand: num = %d\n", (int) GetCurrentThreadId(),
rand_num);
#endif

    return rand_num;
}
```

STRINGS.C

```
//      File:           STRINGS.C
//                              Microsoft TPC-C Kit Ver. 4.00
//                              Copyright Microsoft, 1996, 1997, 1998
//      Purpose:        Source file for database loader string functions


// Includes
#include "tpcc.h"
#include <string.h>
#include <ctype.h>

//==============================================================================
//
// Function name: MakeAddress
//
//==============================================================================

void MakeAddress(char *street_1,
                                 char *street_2,
                                 char *city,
                                 char *state,
                                 char *zip)
{

#ifdef DEBUG
    printf("[%ld]DBG: Entering MakeAddress()\n", (int)
GetCurrentThreadId());
#endif

    MakeAlphaString (10, 20, ADDRESS_LEN, street_1);
    MakeAlphaString (10, 20, ADDRESS_LEN, street_2);
    MakeAlphaString (10, 20, ADDRESS_LEN, city);
    MakeAlphaString ( 2,  2, STATE_LEN, state);
    MakeZipNumberString( 9,  9, ZIP_LEN, zip);

#ifdef DEBUG
    printf("[%ld]DBG: MakeAddress: street_1: %s, street_2: %s, city: %s,
state: %s, zip: %s\n",
                        (int) GetCurrentThreadId(), street_1, street_2,
city, state, zip);
#endif

    return;

}


//==============================================================================
//
// Function name: LastName
//
//==============================================================================

void LastName(int  num,
                      char *name)
{
    static char *n[] =
    {
                "BAR" , "OUGHT", "ABLE" , "PRI"  , "PRES",
                "ESE" , "ANTI" , "CALLY", "ATION", "EING"
    };

#ifdef DEBUG
    printf("[%ld]DBG: Entering LastName()\n", (int) GetCurrentThreadId());
#endif

    if ((num >= 0) && (num < 1000))
    {
                strcpy(name, n[(num/100)%10]);
```

```
                strcat(name, n[(num/10)%10]);
                strcat(name, n[(num/1)%10]);

                if (strlen(name) < LAST_NAME_LEN)
                {
                        PaddString(LAST_NAME_LEN, name);
                }

    }
    else
    {
                printf("\nError in LastName()... num <%ld> out of range
(0,999)\n", num);
                exit(-1);
    }


#ifdef DEBUG
    printf("[%ld]DBG: LastName: num = [%d] ==> [%d][%d][%d]\n",
                    (int) GetCurrentThreadId(), num, num/100,
(num/10)%10, num%10);
        printf("[%ld]DBG: LastName: String = %s\n", (int)
GetCurrentThreadId(), name);
#endif

    return;

}


//==============================================================================
//
// Function name: MakeAlphaString
//
//==============================================================================

//philipdu 08/13/96 Changed MakeAlphaString to use A-Z, a-z, and 0-9 in
//accordance with spec see below:
//The spec says:
//4.3.2.2      The notation random a-string [x .. y]
//(respectively, n-string [x .. y]) represents a string of random
alphanumeric
//(respectively, numeric) characters of a random length of minimum x,
maximum y,
//and mean (y+x)/2. Alphanumerics are A..Z, a..z, and 0..9.  The only
other
//requirement is that the character set used "must be able to represent a
minimum
//of 128 different characters".  We are using 8-bit chars, so this is a
non issue.
//It is completely unreasonable to stuff non-printing chars into the text
fields.
//-CLevine 08/13/96

int MakeAlphaString( int  x, int  y, int  z, char *str)
{
        int             len;
        int             i;
        static  char chArray[] =
"0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz";
        static  int     chArrayMax = 61;

#ifdef DEBUG
    printf("[%ld]DBG: Entering MakeAlphaString()\n", (int)
GetCurrentThreadId());
#endif

        len= RandomNumber(x, y);

        for (i=0; i<len; i++)
                str[i] = chArray[RandomNumber(0, chArrayMax)];
        if ( len < z )
                memset(str+len, ' ', z - len);
        str[len] = 0;

    return len;
}


//==============================================================================
//
// Function name: MakeOriginalAlphaString
//
//==============================================================================

int MakeOriginalAlphaString(int  x,
                                                        int  y,
                                                           int  z,
                                                        char *str,
                                                      int  percent)
{
    int         len;
    int         val;
    int         start;

#ifdef DEBUG
    printf("[%ld]DBG: Entering MakeOriginalAlphaString()\n", (int)
GetCurrentThreadId());
#endif

    // verify prercentage is valid
    if ((percent < 0) || (percent > 100))
    {
                printf("MakeOrigianlAlphaString: Invalid percentage: %d\n",
percent);
                exit(-1);
    }

    // verify string is at least 8 chars in length
    if ((x + y) <= 8)
    {
                printf("MakeOriginalAlphaString: string length must be >=
8\n");
                exit(-1);
    }

    // Make Alpha String
    len = MakeAlphaString(x,y, z, str);

    val = RandomNumber(1,100);
    if (val <= percent)
    {
```

```
            start = RandomNumber(0, len - 8);
            strncpy(str + start, "ORIGINAL", 8);
    }


#ifdef DEBUG
    printf("[%ld]DBG: MakeOriginalAlphaString: : %s\n",
                    (int) GetCurrentThreadId(), str);
#endif

    return strlen(str);
}


//=============================================================================
//
// Function name: MakeNumberString
//
//=============================================================================
int MakeNumberString(int  x, int  y, int  z, char *str)
{
       char tmp[16];

       //MakeNumberString is always called MakeZipNumberString(16, 16,
16, string)

       memset(str, '0', 16);
       itoa(RandomNumber(0, 99999999), tmp, 10);
       memcpy(str, tmp, strlen(tmp));

       itoa(RandomNumber(0, 99999999), tmp, 10);
       memcpy(str+8, tmp, strlen(tmp));

       str[16] = 0;

    return 16;
}


//=============================================================================
//
// Function name: MakeZipNumberString
//
//=============================================================================
int MakeZipNumberString(int  x, int  y, int  z, char *str)
{
       char tmp[16];

       //MakeZipNumberString is always called MakeZipNumberString(9, 9,
9, string)

       strcpy(str, "000011111");

       itoa(RandomNumber(0, 9999), tmp, 10);
       memcpy(str, tmp, strlen(tmp));

    return 9;
}


//=============================================================================
//
// Function name: InitString
//
//=============================================================================
void InitString(char *str, int len)
{
#ifdef DEBUG
    printf("[%ld]DBG: Entering InitString()\n", (int)
GetCurrentThreadId());
#endif

       memset(str, ' ', len);
    str[len] = 0;
}


//=============================================================================
// Function name: InitAddress
//
// Description:
//
//=============================================================================

void InitAddress(char *street_1, char *street_2, char *city, char *state,
char *zip)
{
       memset(street_1, ' ', ADDRESS_LEN+1);
       memset(street_2, ' ', ADDRESS_LEN+1);
       memset(city, ' ', ADDRESS_LEN+1);

    street_1[ADDRESS_LEN+1] = 0;
    street_2[ADDRESS_LEN+1] = 0;
    city[ADDRESS_LEN+1]     = 0;

       memset(state, ' ', STATE_LEN+1);
    state[STATE_LEN+1] = 0;

       memset(zip, ' ', ZIP_LEN+1);
    zip[ZIP_LEN+1] = 0;
}


//=============================================================================
//
// Function name: PaddString
//
//=============================================================================

void PaddString(int max, char *name)
{
       int             len;

       len = strlen(name);
       if ( len < max )
              memset(name+len, ' ', max - len);
       name[max] = 0;

       return;
}
```

TIME.C

```
//      File:          TIME.C
//                             Microsoft TPC-C Kit Ver. 4.00
//                             Copyright Microsoft, 1996, 1997, 1998
//      Purpose:       Source file for time functions


// Includes
#include "tpcc.h"

// Globals
static long start_sec;


//===========================================================================
//
// Function name: TimeNow
//
//===========================================================================

long TimeNow()
{
   long        time_now;
   struct      _timeb el_time;

#ifdef DEBUG
    printf("[%ld]DBG: Entering TimeNow()\n", (int) GetCurrentThreadId());
#endif

   _ftime(&el_time);

   time_now = ((el_time.time - start_sec) * 1000) + el_time.millitm;

   return time_now;
}
```

TPCC.H

```
//      File:          TPCC.H
//                             Microsoft TPC-C Kit Ver. 4.00
//                             Copyright Microsoft, 1996, 1997, 1998
//      Purpose:       Header file for TPC-C database loader


// Build number of TPC Benchmark Kit
#define TPCKIT_VER     "4.00"

// General headers
#include <windows.h>
#include <winbase.h>
#include <stdlib.h>
#include <stdio.h>
#include <process.h>
#include <stddef.h>
#include <stdarg.h>
#include <string.h>
#include <time.h>
#include <sys\timeb.h>
#include <sys\types.h>

// ODBC headers
#include <sql.h>
#include <sqlext.h>
#include <odbcss.h>

// General constants
#define MILLI                           1000
#define FALSE                                0
#define TRUE                                 1
#define UNDEF                                   -1
#define MINPRINTASCII                    32
#define MAXPRINTASCII                   126

// Default environment constants
#define SERVER                               ""
#define DATABASE                             "tpcc"
#define USER                                 "sa"
#define PASSWORD                       ""

// Default loader arguments
#define BATCH                           10000
#define DEFLDPACKSIZE                   32768
#define ORDERS_PER_DIST                  3000
#define LOADER_RES_FILE                   "logs\\load.out"
#define LOADER_NURAND_C                          123
#define DEF_STARTING_WAREHOUSE                1
#define BUILD_INDEX                                   1       // build both
data and indexes
#define INDEX_ORDER                                   1       // build
indexes before load
#define SCALE_DOWN                                    0   // build a normal
scale database
#define INDEX_SCRIPT_PATH     "scripts"

typedef struct
{
    char                            *server;
    char                            *database;
    char                            *user;
    char                            *password;
       BOOL                         tables_all;                  // set
if loading all tables
       BOOL                         table_item;                  // set
if loading ITEM table specifically
       BOOL                         table_warehouse;       // set if
loading WAREHOUSE, DISTRICT, and STOCK
       BOOL                         table_customer;              // set
if loading CUSTOMER and HISTORY
       BOOL                         table_orders;          // set if
loading NEW-ORDER, ORDERS, ORDER-LINE
    long                            num_warehouses;
    long                            batch;
    long                            verbose;
       long                         pack_size;
       char                         *loader_res_file;
       char                         *synch_servername;
       long                         case_sensitivity;
       long                         starting_warehouse;
```

```
        long                            build_index;
        long                            index_order;
        long                            scale_down;
        char                            *index_script_path;
} TPCCLDR_ARGS;

// String length constants
        #define SERVER_NAME_LEN            20
        #define DATABASE_NAME_LEN          20
        #define USER_NAME_LEN              20
        #define PASSWORD_LEN               20
        #define TABLE_NAME_LEN             20
        #define I_DATA_LEN                 50
        #define I_NAME_LEN                 24
        #define BRAND_LEN                   1
        #define LAST_NAME_LEN              16
        #define W_NAME_LEN                 10
        #define ADDRESS_LEN                20
        #define STATE_LEN                   2
        #define ZIP_LEN                     9
        #define S_DIST_LEN                 24
        #define S_DATA_LEN                 50
        #define D_NAME_LEN                 10
        #define FIRST_NAME_LEN             16
        #define MIDDLE_NAME_LEN             2
        #define PHONE_LEN                  16
        #define CREDIT_LEN                  2
        #define C_DATA_LEN                500
        #define H_DATA_LEN                 24
        #define DIST_INFO_LEN              24
        #define MAX_OL_NEW_ORDER_ITEMS     15
        #define MAX_OL_ORDER_STATUS_ITEMS  15
        #define STATUS_LEN                 25
        #define OL_DIST_INFO_LEN                24
        #define C_SINCE_LEN                             23
        #define H_DATE_LEN                              23
        #define OL_DELIVERY_D_LEN               23
        #define O_ENTRY_D_LEN              23


// Functions in random.c
void    seed();
long    irand();
double  drand();
void    WUCreate();
short   WURand();
long    RandomNumber(long lower, long upper);

// Functions in getargs.c;
void    GetArgsLoader();
void    GetArgsLoaderUsage();

// Functions in time.c
long    TimeNow();

// Functions in strings.c
void    MakeAddress();
void    LastName();
int     MakeAlphaString();
int     MakeOriginalAlphaString();
int     MakeNumberString();
int     MakeZipNumberString();
void    InitString();
void    InitAddress();
void    PaddString();
```

TPCCLDR.C

```
//      File:           TPCCLDR.C
//                              Microsoft TPC-C Kit Ver. 4.00
//                              Copyright Microsoft, 1996, 1997, 1998
//      Purpose:        Source file for TPC-C database loader


// Includes
#include "tpcc.h"
#include "search.h"

// Defines
#define MAXITEMS                 100000
#define MAXITEMS_SCALE_DOWN           100
#define CUSTOMERS_PER_DISTRICT  3000
#define CUSTOMERS_SCALE_DOWN  30
#define DISTRICT_PER_WAREHOUSE  10
#define ORDERS_PER_DISTRICT     3000
#define ORDERS_SCALE_DOWN       30
#define MAX_CUSTOMER_THREADS    2
#define MAX_ORDER_THREADS       3
#define MAX_MAIN_THREADS        4

// Functions declarations

void HandleErrorDBC (SQLHDBC  hdbc1);

long NURand();
void LoadItem();
void LoadWarehouse();

void Stock();
void District();

void LoadCustomer();
void CustomerBufInit();
void CustomerBufLoad();
void LoadCustomerTable();
void LoadHistoryTable();

void LoadOrders();
void OrdersBufInit();
void OrdersBufLoad();
void LoadOrdersTable();
void LoadNewOrderTable();
void LoadOrderLineTable();
void GetPermutation();
void CheckForCommit();
void OpenConnections();
void BuildIndex();
void FormatDate ();

// Shared memory structures
```

```
typedef struct
{
    long                ol;
    long                ol_i_id;
    short               ol_supply_w_id;
    short               ol_quantity;
    double              ol_amount;
    char                ol_dist_info[DIST_INFO_LEN+1];
       char                         ol_delivery_d[OL_DELIVERY_D_LEN+1];
} ORDER_LINE_STRUCT;

typedef struct
{
    long                o_id;
    short               o_d_id;
    short               o_w_id;
    long                o_c_id;
    short               o_carrier_id;
    short               o_ol_cnt;
    short               o_all_local;
       ORDER_LINE_STRUCT   o_ol[15];
} ORDERS_STRUCT;

typedef struct
{
    long                              c_id;
    short                             c_d_id;
    short                             c_w_id;
       char                           c_first[FIRST_NAME_LEN+1];
    char                              c_middle[MIDDLE_NAME_LEN+1];
    char                              c_last[LAST_NAME_LEN+1];
    char                              c_street_1[ADDRESS_LEN+1];
    char                              c_street_2[ADDRESS_LEN+1];
    char                              c_city[ADDRESS_LEN+1];
    char                              c_state[STATE_LEN+1];
    char                              c_zip[ZIP_LEN+1];
    char                              c_phone[PHONE_LEN+1];
    char                              c_credit[CREDIT_LEN+1];
    double                            c_credit_lim;
    double                            c_discount;
//  fix to avoid ODBC float to numeric conversion problem.
//  double                            c_balance;
       char                           c_balance[6];

    double                            c_ytd_payment;
       short                          c_payment_cnt;
       short                          c_delivery_cnt;
       char                           c_data[C_DATA_LEN+1];
       double                         h_amount;
    char                              h_data[H_DATA_LEN+1];
} CUSTOMER_STRUCT;

typedef struct
{
       char                           c_last[LAST_NAME_LEN+1];
       char                           c_first[FIRST_NAME_LEN+1];
    long                              c_id;
} CUSTOMER_SORT_STRUCT;

typedef struct
{
   long                time_start;
} LOADER_TIME_STRUCT;


// Global variables

char    szLastError[300];

HENV    henv;

HDBC    i_hdbc1;                                        // for ITEM table
HDBC    w_hdbc1;                                        // for WAREHOUSE,
DISTRICT, STOCK
HDBC    c_hdbc1;                                        // for CUSTOMER
HDBC    c_hdbc2;                                        // for HISTORY
HDBC    o_hdbc1;                                        // for ORDERS
HDBC    o_hdbc2;                                        // for NEW-ORDER

HDBC    o_hdbc3;                                        // for ORDER-LINE

HSTMT   i_hstmt1;
HSTMT   w_hstmt1;
HSTMT   c_hstmt1, c_hstmt2;
HSTMT   o_hstmt1, o_hstmt2, o_hstmt3;

ORDERS_STRUCT   orders_buf[ORDERS_PER_DISTRICT];
CUSTOMER_STRUCT customer_buf[CUSTOMERS_PER_DISTRICT];
long            orders_rows_loaded;
long            new_order_rows_loaded;
long            order_line_rows_loaded;
long            history_rows_loaded;
long            customer_rows_loaded;
long            stock_rows_loaded;
long            district_rows_loaded;
long            item_rows_loaded;
long            warehouse_rows_loaded;
long            main_time_start;
long            main_time_end;
long                  max_items;
long                  customers_per_district;
long                  orders_per_district;
long                  first_new_order;
long                  last_new_order;


TPCCLDR_ARGS    *aptr, args;


//============================================================================
//
// Function name: main
//
//============================================================================

int main(int  argc, char **argv)
{

       DWORD           dwThreadID[MAX_MAIN_THREADS];
       HANDLE          hThread[MAX_MAIN_THREADS];
       FILE            *fLoader;
       char            buffer[255];
```

```
        int                             i;

        for (i=0; i<MAX_MAIN_THREADS; i++)
                hThread[i] = NULL;

    printf("\n*************************************************");
        printf("\n*                                               *");
        printf("\n*  Microsoft SQL Server                         *");
        printf("\n*                                               *");
        printf("\n*  TPC-C BENCHMARK KIT:  Database loader        *");
        printf("\n*  Version %s                                  *",
TPCKIT_VER);
        printf("\n*                                               *");
        printf("\n*************************************************\n\n"
);

    // process command line arguments

    aptr = &args;
    GetArgsLoader(argc, argv, aptr);

        printf("Build interface is ODBC.\n");

        if (aptr->build_index == 0)
                printf("Data load only - no index creation.\n");
        else
                printf("Data load and index creation.\n");

        if (aptr->index_order == 0)
                printf("Clustered indexes will be created after bulk
load.\n");
        else
                printf("Clustered indexes will be created before bulk
load.\n");

        // set database scale values
        if (aptr->scale_down == 1)
        {
                printf("*** Scaled Down Database ***\n");
                max_items = MAXITEMS_SCALE_DOWN;
                customers_per_district = CUSTOMERS_SCALE_DOWN;
                orders_per_district = ORDERS_SCALE_DOWN;
                first_new_order = 0;
                last_new_order  = 30;
        }
        else
        {
                max_items = MAXITEMS;
                customers_per_district = CUSTOMERS_PER_DISTRICT;
                orders_per_district = ORDERS_PER_DISTRICT;
                first_new_order = 2100;
                last_new_order  = 3000;
        }

        // open connections to SQL Server

        OpenConnections();

        // open file for loader results
    fLoader = fopen(aptr->loader_res_file, "w");
    if (fLoader == NULL)
        {
                printf("Error, loader result file open failed.");
                exit(-1);
        }

    // start loading data

    sprintf(buffer,"TPC-C load started for %ld warehouses.\n",aptr-
>num_warehouses);

        printf("%s",buffer);
        fprintf(fLoader,"%s",buffer);

        main_time_start = (TimeNow() / MILLI);

        // start parallel load threads


        if (aptr->tables_all || aptr->table_item)
        {
                fprintf(fLoader, "\nStarting loader threads for: item\n");

                hThread[0] = CreateThread(NULL,
                                                                        0,
(LPTHREAD_START_ROUTINE) LoadItem,
                                                                        NULL,
                                                                        0,
&dwThreadID[0]);

                if (hThread[0] == NULL)
                {
                        printf("Error, failed in creating creating thread =
0.\n");
                        exit(-1);
                }
        }

        if (aptr->tables_all || aptr->table_warehouse)
        {
                fprintf(fLoader, "Starting loader threads for:
warehouse\n");

                hThread[1] = CreateThread(NULL,
                                                                        0,
(LPTHREAD_START_ROUTINE) LoadWarehouse,
                                                                        NULL,
                                                                        0,
&dwThreadID[1]);

                if (hThread[1] == NULL)
                {
                        printf("Error, failed in creating creating thread =
1.\n");
                        exit(-1);
                }
        }
```

```
        if (aptr->tables_all || aptr->table_customer)
        {
                fprintf(fLoader, "Starting loader threads for:
customer\n");

                hThread[2] = CreateThread(NULL,
                                                                0,

(LPTHREAD_START_ROUTINE) LoadCustomer,
                                                                NULL,
                                                                0,

&dwThreadID[2]);

                if (hThread[2] == NULL)
                {
                        printf("Error, failed in creating creating main
thread = 2.\n");
                        exit(-1);
                }
        }

        if (aptr->tables_all || aptr->table_orders)
        {
                fprintf(fLoader, "Starting loader threads for: orders\n");

                hThread[3] = CreateThread(NULL,
                                                                0,

(LPTHREAD_START_ROUTINE) LoadOrders,
                                                                NULL,
                                                                0,

&dwThreadID[3]);

                if (hThread[3] == NULL)
                {
                        printf("Error, failed in creating creating main
thread = 3.\n");
                        exit(-1);
                }
        }

        // Wait for threads to finish...
        for (i=0; i<MAX_MAIN_THREADS; i++)
        {
                if (hThread[i] != NULL)
                {
                        WaitForSingleObject( hThread[i], INFINITE );
                        CloseHandle(hThread[i]);
                        hThread[i] = NULL;
                }
        }

        main_time_end = (TimeNow() / MILLI);

    sprintf(buffer,"\nTPC-C load completed successfully in %ld
minutes.\n",
                        (main_time_end - main_time_start)/60);
        printf("%s",buffer);
        fprintf(fLoader, "%s", buffer);

        fclose(fLoader);

        SQLFreeEnv(henv);

    exit(0);

        return 0;
}


//============================================================================
//
// Function name: LoadItem
//
//============================================================================

void LoadItem()
{
    long                i_id;
        long            i_im_id;
    char                i_name[I_NAME_LEN+1];
    double              i_price;
    char                i_data[I_DATA_LEN+1];
        char            name[20];
        long            time_start;
        RETCODE         rc;
        DBINT           rcint;
        char            bcphint[128];

        // Seed with unique number
        seed(1);

        printf("Loading item table...\n");

        // if build index before load
        if ((aptr->build_index == 1) && (aptr->index_order == 1))
                BuildIndex("idxitmcl");

        InitString(i_name, I_NAME_LEN+1);
        InitString(i_data, I_DATA_LEN+1);

        sprintf(name, "%s..%s", aptr->database, "item");

        rc = bcp_init(i_hdbc1, name, NULL, "logs\\item.err", DB_IN);
        if (rc != SUCCEED)
                HandleErrorDBC(i_hdbc1);

        if ((aptr->build_index == 1) && (aptr->index_order == 1))
        {
                sprintf(bcphint, "tablock, order (i_id), ROWS_PER_BATCH =
100000");
                rc = bcp_control(i_hdbc1, BCPHINTS, (void*) bcphint);
                if (rc != SUCCEED)
                        HandleErrorDBC(i_hdbc1);
        }

        rc = bcp_bind(i_hdbc1, (BYTE *) &i_id, 0, SQL_VARLEN_DATA, NULL,
0, SQLINT4, 1);
```

```
        if (rc != SUCCEED)
                HandleErrorDBC(i_hdbc1);

        rc = bcp_bind(i_hdbc1, (BYTE *) &i_im_id, 0, SQL_VARLEN_DATA,
NULL, 0, SQLINT4, 2);
        if (rc != SUCCEED)
                HandleErrorDBC(i_hdbc1);

        rc = bcp_bind(i_hdbc1, (BYTE *) i_name, 0, I_NAME_LEN, NULL, 0, 0,
3);
        if (rc != SUCCEED)
                HandleErrorDBC(i_hdbc1);

        rc = bcp_bind(i_hdbc1, (BYTE *) &i_price, 0, SQL_VARLEN_DATA,
NULL, 0, SQLFLT8, 4);
        if (rc != SUCCEED)
                HandleErrorDBC(i_hdbc1);

        rc = bcp_bind(i_hdbc1, (BYTE *) i_data, 0, I_DATA_LEN, NULL, 0, 0,
5);
        if (rc != SUCCEED)
                HandleErrorDBC(i_hdbc1);

        time_start = (TimeNow() / MILLI);

        item_rows_loaded = 0;

        for (i_id = 1; i_id <= max_items; i_id++)
        {
                i_im_id = RandomNumber(1L, 10000L);

                MakeAlphaString(14, 24, I_NAME_LEN, i_name);

                i_price = ((float) RandomNumber(100L, 10000L))/100.0;

                MakeOriginalAlphaString(26, 50, I_DATA_LEN, i_data, 10);

                rc = bcp_sendrow(i_hdbc1);
                if (rc != SUCCEED)
                        HandleErrorDBC(i_hdbc1);

                item_rows_loaded++;
                CheckForCommit(i_hdbc1, i_hstmt1, item_rows_loaded, "item",
&time_start);
        }

        rcint = bcp_done(i_hdbc1);
        if (rcint < 0)
                HandleErrorDBC(i_hdbc1);

        printf("Finished loading item table.\n");

        SQLFreeStmt(i_hstmt1, SQL_DROP);
        SQLDisconnect(i_hdbc1);
        SQLFreeConnect(i_hdbc1);

        // if build index after load
        if ((aptr->build_index == 1) && (aptr->index_order == 0))
                BuildIndex("idxitmcl");

}
```

```
//==============================================================================
=====
//
// Function   : LoadWarehouse
//
// Loads WAREHOUSE table and loads Stock and District as Warehouses are
created
//
//==============================================================================
=====

void LoadWarehouse()
{
    short      w_id;
    char       w_name[W_NAME_LEN+1];
    char       w_street_1[ADDRESS_LEN+1];
    char       w_street_2[ADDRESS_LEN+1];
    char       w_city[ADDRESS_LEN+1];
    char       w_state[STATE_LEN+1];
    char       w_zip[ZIP_LEN+1];
    double     w_tax;
    double     w_ytd;
        char    name[20];
        long    time_start;
        RETCODE rc;
        DBINT   rcint;
        char    bcphint[128];


        // Seed with unique number
        seed(2);

        printf("Loading warehouse table...\n");

        // if build index before load...
        if ((aptr->build_index == 1) && (aptr->index_order == 1))
                BuildIndex("idxwarcl");

        InitString(w_name, W_NAME_LEN+1);
        InitAddress(w_street_1, w_street_2, w_city, w_state, w_zip);

        sprintf(name, "%s..%s", aptr->database, "warehouse");

        rc = bcp_init(w_hdbc1, name, NULL, "logs\\whouse.err", DB_IN);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        if ((aptr->build_index == 1) && (aptr->index_order == 1))
        {
                sprintf(bcphint, "tablock, order (w_id), ROWS_PER_BATCH =
%d", aptr->num_warehouses);
                rc = bcp_control(w_hdbc1, BCPHINTS, (void*) bcphint);
                if (rc != SUCCEED)
                        HandleErrorDBC(w_hdbc1);
        }

        rc = bcp_bind(w_hdbc1, (BYTE *) &w_id, 0, SQL_VARLEN_DATA, NULL,
0, SQLINT2, 1);
        if (rc != SUCCEED)
```

```
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) w_name, 0, W_NAME_LEN, NULL, 0, 0,
2);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) w_street_1, 0, ADDRESS_LEN, NULL,
0, 0, 3);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) w_street_2, 0, ADDRESS_LEN, NULL,
0, 0, 4);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) w_city, 0, ADDRESS_LEN, NULL, 0,
0, 5);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) w_state, 0, STATE_LEN, NULL, 0, 0,
6);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) w_zip, 0, ZIP_LEN, NULL, 0, 0, 7);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) &w_tax, 0, SQL_VARLEN_DATA, NULL,
0, SQLFLT8, 8);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) &w_ytd, 0, SQL_VARLEN_DATA, NULL,
0, SQLFLT8, 9);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        time_start = (TimeNow() / MILLI);

        warehouse_rows_loaded = 0;

        for (w_id = (short)aptr->starting_warehouse; w_id <= aptr-
>num_warehouses; w_id++)
        {
                MakeAlphaString(6,10, W_NAME_LEN, w_name);

                MakeAddress(w_street_1, w_street_2, w_city, w_state,
w_zip);

                w_tax = ((float) RandomNumber(0L,2000L))/10000.00;

                w_ytd = 300000.00;

                rc = bcp_sendrow(w_hdbc1);
                if (rc != SUCCEED)
                        HandleErrorDBC(w_hdbc1);

                warehouse_rows_loaded++;
                CheckForCommit(w_hdbc1, i_hstmt1, warehouse_rows_loaded,
"warehouse", &time_start);
        }

        rcint = bcp_done(w_hdbc1);
        if (rcint < 0)
                HandleErrorDBC(w_hdbc1);

        printf("Finished loading warehouse table.\n");

        // if build index after load...
        if ((aptr->build_index == 1) && (aptr->index_order == 0))
                BuildIndex("idxwarcl");

        stock_rows_loaded = 0;
        district_rows_loaded = 0;

        District();
        Stock();

}


//============================================================================
//
// Function   : District
//
//============================================================================

void District()
{
    short      d_id;
    short      d_w_id;
    char       d_name[D_NAME_LEN+1];
    char       d_street_1[ADDRESS_LEN+1];
    char       d_street_2[ADDRESS_LEN+1];
    char       d_city[ADDRESS_LEN+1];
    char       d_state[STATE_LEN+1];
    char       d_zip[ZIP_LEN+1];
    double     d_tax;
    double     d_ytd;
       char    name[20];
    long       d_next_o_id;
       long    time_start;
       int             w_id;
       RETCODE rc;
       DBINT   rcint;
       char    bcphint[128];

       // Seed with unique number
       seed(4);

       printf("Loading district table...\n");

       // build index before load
       if ((aptr->build_index == 1) && (aptr->index_order == 1))
                BuildIndex("idxdiscl");

       InitString(d_name, D_NAME_LEN+1);
       InitAddress(d_street_1, d_street_2, d_city, d_state, d_zip);
```

```
        sprintf(name, "%s..%s", aptr->database, "district");

        rc = bcp_init(w_hdbc1, name, NULL, "logs\\district.err", DB_IN);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        if ((aptr->build_index == 1) && (aptr->index_order == 1))
        {
                sprintf(bcphint, "tablock, order (d_w_id, d_id),
ROWS_PER_BATCH = %u", (aptr->num_warehouses * 10));
                rc = bcp_control(w_hdbc1, BCPHINTS, (void*) bcphint);
                if (rc != SUCCEED)
                        HandleErrorDBC(w_hdbc1);
        }

        rc = bcp_bind(w_hdbc1, (BYTE *) &d_id, 0, SQL_VARLEN_DATA, NULL,
0, SQLINT2, 1);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) &d_w_id, 0, SQL_VARLEN_DATA, NULL,
0, SQLINT2, 2);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) d_name, 0, D_NAME_LEN, NULL, 0, 0,
3);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) d_street_1, 0, ADDRESS_LEN, NULL,
0, 0, 4);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) d_street_2, 0, ADDRESS_LEN, NULL,
0, 0, 5);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) d_city, 0, ADDRESS_LEN, NULL, 0,
0, 6);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) d_state, 0, STATE_LEN, NULL, 0, 0,
7);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) d_zip, 0, ZIP_LEN, NULL, 0, 0, 8);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) &d_tax, 0, SQL_VARLEN_DATA, NULL,
0, SQLFLT8, 9);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) &d_ytd, 0, SQL_VARLEN_DATA, NULL,
0, SQLFLT8, 10);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) &d_next_o_id, 0, SQL_VARLEN_DATA,
NULL, 0, SQLINT4, 11);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        d_ytd  = 30000.0;

        d_next_o_id = orders_per_district+1;

        time_start = (TimeNow() / MILLI);

        for (w_id = aptr->starting_warehouse; w_id <= aptr-
>num_warehouses; w_id++)
        {
                d_w_id = w_id;

                for (d_id = 1; d_id <= DISTRICT_PER_WAREHOUSE; d_id++)
                {
                        MakeAlphaString(6,10,D_NAME_LEN, d_name);

                        MakeAddress(d_street_1, d_street_2, d_city,
d_state, d_zip);

                        d_tax = ((float) RandomNumber(0L,2000L))/10000.00;

                        rc = bcp_sendrow(w_hdbc1);
                        if (rc != SUCCEED)
                                HandleErrorDBC(w_hdbc1);

                        district_rows_loaded++;
                        CheckForCommit(w_hdbc1, w_hstmt1,
district_rows_loaded, "district", &time_start);
                }
    }

        rcint = bcp_done(w_hdbc1);
        if (rcint < 0)
                HandleErrorDBC(w_hdbc1);

        printf("Finished loading district table.\n");

        // if build index after load...
        if ((aptr->build_index == 1) && (aptr->index_order == 0))
                BuildIndex("idxdiscl");

    return;
}


//================================================================================
//
// Function   : Stock
//
//================================================================================

void Stock()
{
    long       s_i_id;
```

```
    short       s_w_id;
    short       s_quantity;
    char        s_dist_01[S_DIST_LEN+1];
    char        s_dist_02[S_DIST_LEN+1];
    char        s_dist_03[S_DIST_LEN+1];
    char        s_dist_04[S_DIST_LEN+1];
    char        s_dist_05[S_DIST_LEN+1];
    char        s_dist_06[S_DIST_LEN+1];
    char        s_dist_07[S_DIST_LEN+1];
    char        s_dist_08[S_DIST_LEN+1];
    char        s_dist_09[S_DIST_LEN+1];
    char        s_dist_10[S_DIST_LEN+1];
    long        s_ytd;
    short       s_order_cnt;
    short       s_remote_cnt;
    char        s_data[S_DATA_LEN+1];
    short       len;
        char    name[20];
        long    time_start;
        RETCODE rc;
        DBINT   rcint;
        char    bcphint[128];

        // Seed with unique number
        seed(3);

        // if build index before load...
        if ((aptr->build_index == 1) && (aptr->index_order == 1))
                BuildIndex("idxstkcl");

        sprintf(name, "%s..%s", aptr->database, "stock");

        rc = bcp_init(w_hdbc1, name, NULL, "logs\\stock.err", DB_IN);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        if ((aptr->build_index == 1) && (aptr->index_order == 1))
        {
                sprintf(bcphint, "tablock, order (s_i_id, s_w_id),
ROWS_PER_BATCH = %u", (aptr->num_warehouses * 100000));
                rc = bcp_control(w_hdbc1, BCPHINTS, (void*) bcphint);
                if (rc != SUCCEED)
                        HandleErrorDBC(w_hdbc1);
        }

        rc = bcp_bind(w_hdbc1, (BYTE *) &s_i_id, 0, SQL_VARLEN_DATA, NULL,
0, SQLINT4, 1);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        bcp_bind(w_hdbc1, (BYTE *) &s_w_id, 0, SQL_VARLEN_DATA, NULL, 0,
SQLINT2, 2);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) &s_quantity, 0, SQL_VARLEN_DATA,
NULL, 0, SQLINT2, 3);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) s_dist_01, 0, S_DIST_LEN, NULL, 0,
0, 4);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) s_dist_02, 0, S_DIST_LEN, NULL, 0,
0, 5);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) s_dist_03, 0, S_DIST_LEN, NULL, 0,
0, 6);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) s_dist_04, 0, S_DIST_LEN, NULL, 0,
0, 7);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) s_dist_05, 0, S_DIST_LEN, NULL, 0,
0, 8);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) s_dist_06, 0, S_DIST_LEN, NULL, 0,
0, 9);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) s_dist_07, 0, S_DIST_LEN, NULL, 0,
0, 10);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) s_dist_08, 0, S_DIST_LEN, NULL, 0,
0, 11);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) s_dist_09, 0, S_DIST_LEN, NULL, 0,
0, 12);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) s_dist_10, 0, S_DIST_LEN, NULL, 0,
0, 13);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) &s_ytd, 0, SQL_VARLEN_DATA, NULL,
0, SQLINT4, 14);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) &s_order_cnt, 0, SQL_VARLEN_DATA,
NULL, 0, SQLINT2, 15);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);
```

```
        rc = bcp_bind(w_hdbc1, (BYTE *) &s_remote_cnt, 0, SQL_VARLEN_DATA,
NULL, 0, SQLINT2, 16);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = bcp_bind(w_hdbc1, (BYTE *) s_data, 0, S_DATA_LEN, NULL, 0, 0,
17);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        s_ytd = s_order_cnt = s_remote_cnt = 0;

        time_start = (TimeNow() / MILLI);

        printf("...Loading stock table\n");

        for (s_i_id=1; s_i_id <= max_items; s_i_id++)
        {

                for (s_w_id = (short)aptr->starting_warehouse; s_w_id <=
aptr->num_warehouses; s_w_id++)
                {

                        s_quantity = (short)RandomNumber(10L,100L);
                        len = MakeAlphaString(24,24,S_DIST_LEN, s_dist_01);
                        len = MakeAlphaString(24,24,S_DIST_LEN, s_dist_02);
                        len = MakeAlphaString(24,24,S_DIST_LEN, s_dist_03);
                        len = MakeAlphaString(24,24,S_DIST_LEN, s_dist_04);
                        len = MakeAlphaString(24,24,S_DIST_LEN, s_dist_05);
                        len = MakeAlphaString(24,24,S_DIST_LEN, s_dist_06);
                        len = MakeAlphaString(24,24,S_DIST_LEN, s_dist_07);
                        len = MakeAlphaString(24,24,S_DIST_LEN, s_dist_08);
                        len = MakeAlphaString(24,24,S_DIST_LEN, s_dist_09);
                        len = MakeAlphaString(24,24,S_DIST_LEN, s_dist_10);

                        len = MakeOriginalAlphaString(26,50, S_DATA_LEN,
s_data,10);

                        rc = bcp_sendrow(w_hdbc1);
                        if (rc != SUCCEED)
                                HandleErrorDBC(w_hdbc1);

                        stock_rows_loaded++;
                        CheckForCommit(w_hdbc1, w_hstmt1,
stock_rows_loaded, "stock", &time_start);

                }
        }

        rcint = bcp_done(w_hdbc1);
        if (rcint < 0)
                HandleErrorDBC(w_hdbc1);

        printf("Finished loading stock table.\n");

        SQLFreeStmt(w_hstmt1, SQL_DROP);
        SQLDisconnect(w_hdbc1);
        SQLFreeConnect(w_hdbc1);

        // if build index after load...
        if ((aptr->build_index == 1) && (aptr->index_order == 0))
                BuildIndex("idxstkcl");

        return;
}


//==============================================================================
//
// Function   : LoadCustomer
//
//==============================================================================

void LoadCustomer()
{
        LOADER_TIME_STRUCT      customer_time_start;
        LOADER_TIME_STRUCT      history_time_start;
        short                           w_id;
    short                       d_id;
        DWORD                           dwThreadID[MAX_CUSTOMER_THREADS];
        HANDLE                          hThread[MAX_CUSTOMER_THREADS];
        char                            name[20];
        RETCODE                                 rc;
        DBINT                                   rcint;
        char                                    bcphint[128];
        char                                    cmd[256];
        // SQLRETURN                            rc_1;
        // SQLSMALLINT                          recnum, MsgLen;
        // SQLCHAR                                      SqlState[6],
Msg[SQL_MAX_MESSAGE_LENGTH];
        // SQLINTEGER                           NativeError;

        // Seed with unique number
        seed(5);

        printf("Loading customer and history tables...\n");

        // if build index before load...
        if ((aptr->build_index == 1) && (aptr->index_order == 1))
                BuildIndex("idxcuscl");

        // Initialize bulk copy
        sprintf(name, "%s..%s", aptr->database, "customer");

        rc = bcp_init(c_hdbc1, name, NULL, "logs\\customer.err", DB_IN);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc1);

        if ((aptr->build_index == 1) && (aptr->index_order == 1))
        {
                sprintf(bcphint, "tablock, order (c_w_id, c_d_id, c_id),
ROWS_PER_BATCH = %u", (aptr->num_warehouses * 30000));
                rc = bcp_control(c_hdbc1, BCPHINTS, (void*) bcphint);
                if (rc != SUCCEED)
                        HandleErrorDBC(c_hdbc1);
        }

        sprintf(name, "%s..%s", aptr->database, "history");

        rc = bcp_init(c_hdbc2, name, NULL, "logs\\history.err", DB_IN);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc2);
```

```
        sprintf(bcphint, "tablock");
        rc = bcp_control(c_hdbc2, BCPHINTS, (void*) bcphint);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc2);

        customer_rows_loaded    = 0;
        history_rows_loaded     = 0;

        CustomerBufInit();

        customer_time_start.time_start = (TimeNow() / MILLI);
        history_time_start.time_start = (TimeNow() / MILLI);

        for (w_id = (short)aptr->starting_warehouse; w_id <= aptr-
>num_warehouses; w_id++)
        {
                for (d_id = 1; d_id <= DISTRICT_PER_WAREHOUSE; d_id++)
                {

                        CustomerBufLoad(d_id, w_id);

                        // Start parallel loading threads here...

                        // Start customer table thread

                        printf("...Loading customer table for: d_id = %d,
w_id = %d\n", d_id, w_id);

                        hThread[0] = CreateThread(NULL,
                                                                        0,

(LPTHREAD_START_ROUTINE) LoadCustomerTable,

&customer_time_start,
                                                                        0,

&dwThreadID[0]);

                        if (hThread[0] == NULL)
                        {
                                printf("Error, failed in creating creating
thread = 0.\n");
                                exit(-1);
                        }

                        // Start History table thread

                        printf("...Loading history table for: d_id = %d,
w_id = %d\n", d_id, w_id);

                        hThread[1] = CreateThread(NULL,
                                                                        0,

(LPTHREAD_START_ROUTINE) LoadHistoryTable,

&history_time_start,
                                                                        0,

&dwThreadID[1]);

                        if (hThread[1] == NULL)
                        {
                                printf("Error, failed in creating creating
thread = 1.\n");
                                exit(-1);
                        }

                        WaitForSingleObject( hThread[0], INFINITE );
                        WaitForSingleObject( hThread[1], INFINITE );

                        if (CloseHandle(hThread[0]) == FALSE)
                        {
                                printf("Error, failed in closing customer
thread handle with errno: %d\n", GetLastError());
                        }

                        if (CloseHandle(hThread[1]) == FALSE)
                        {
                                printf("Error, failed in closing history
thread handle with errno: %d\n", GetLastError());
                        }


                }

        }

        // flush the bulk connection
        rcint = bcp_done(c_hdbc1);
        if (rcint < 0)
                HandleErrorDBC(c_hdbc1);

        rcint = bcp_done(c_hdbc2);
        if (rcint < 0)
                HandleErrorDBC(c_hdbc2);

        printf("Finished loading customer table.\n");

        // if build index after load...
        if ((aptr->build_index == 1) && (aptr->index_order == 0))
                BuildIndex("idxcuscl");

        // build non-clustered index
        if (aptr->build_index == 1)
                BuildIndex("idxcusnc");

        // Output the NURAND used for the loader into C_FIRST for C_ID =
1,
        // C_W_ID = 1, and C_D_ID = 1
        sprintf(cmd, "isql -S%s -U%s -P%s -d%s -e -Q\"update customer set
c_first = 'C_LOAD = %d' where c_id = 1 and c_w_id = 1 and c_d_id = 1\" >
logs\\nurand_load.log",
                                aptr->server,
                                aptr->user,
                                aptr->password,
                                aptr->database,
                                LOADER_NURAND_C);

        system(cmd);

        SQLFreeStmt(c_hstmt1, SQL_DROP);
```

```
        SQLDisconnect(c_hdbc1);
        SQLFreeConnect(c_hdbc1);

        SQLFreeStmt(c_hstmt2, SQL_DROP);
        SQLDisconnect(c_hdbc2);
        SQLFreeConnect(c_hdbc2);


    return;

}


//============================================================================
//
// Function   : CustomerBufInit
//
//============================================================================

void CustomerBufInit()
{
        int     i;

        for (i=0;i<customers_per_district;i++)
        {
                customer_buf[i].c_id = 0;
                customer_buf[i].c_d_id = 0;
                customer_buf[i].c_w_id = 0;

                strcpy(customer_buf[i].c_first,"");
                strcpy(customer_buf[i].c_middle,"");
                strcpy(customer_buf[i].c_last,"");
                strcpy(customer_buf[i].c_street_1,"");
                strcpy(customer_buf[i].c_street_2,"");
                strcpy(customer_buf[i].c_city,"");
                strcpy(customer_buf[i].c_state,"");
                strcpy(customer_buf[i].c_zip,"");
                strcpy(customer_buf[i].c_phone,"");
                strcpy(customer_buf[i].c_credit,"");

                customer_buf[i].c_credit_lim = 0;
                customer_buf[i].c_discount = (float) 0;

                //  fix to avoid ODBC float to numeric conversion problem.
                //      customer_buf[i].c_balance = 0;
                strcpy(customer_buf[i].c_balance,"");

                customer_buf[i].c_ytd_payment = 0;
                customer_buf[i].c_payment_cnt = 0;
                customer_buf[i].c_delivery_cnt = 0;

                strcpy(customer_buf[i].c_data,"");

                customer_buf[i].h_amount = 0;

                strcpy(customer_buf[i].h_data,"");

        }


}


//============================================================================
//
// Function   : CustomerBufLoad
//
// Fills shared buffer for HISTORY and CUSTOMER
//============================================================================

void CustomerBufLoad(int d_id, int w_id)
{
        long                                    i;
    CUSTOMER_SORT_STRUCT    c[CUSTOMERS_PER_DISTRICT];


        for (i=0;i<customers_per_district;i++)
        {
                if (i < 1000)
                        LastName(i, c[i].c_last);
                else
                        LastName(NURand(255,0,999,LOADER_NURAND_C),
c[i].c_last);

                MakeAlphaString(8,16,FIRST_NAME_LEN, c[i].c_first);

                c[i].c_id = i+1;

        }

        printf("...Loading customer buffer for: d_id = %d, w_id = %d\n",
                        d_id, w_id);

        for (i=0;i<customers_per_district;i++)
        {

                customer_buf[i].c_d_id = d_id;
                customer_buf[i].c_w_id = w_id;
                customer_buf[i].h_amount = 10.0;

                customer_buf[i].c_ytd_payment  = 10.0;

                customer_buf[i].c_payment_cnt  = 1;
                customer_buf[i].c_delivery_cnt = 0;

                // Generate CUSTOMER and HISTORY data

                customer_buf[i].c_id = c[i].c_id;

                strcpy(customer_buf[i].c_first, c[i].c_first);
                strcpy(customer_buf[i].c_last, c[i].c_last);

                customer_buf[i].c_middle[0] = 'O';
                customer_buf[i].c_middle[1] = 'E';

                MakeAddress(customer_buf[i].c_street_1,
                                customer_buf[i].c_street_2,
                                customer_buf[i].c_city,
                                customer_buf[i].c_state,
                                customer_buf[i].c_zip);
```

```
                MakeNumberString(16, 16, PHONE_LEN,
customer_buf[i].c_phone);

                if (RandomNumber(1L, 100L) > 10)
                        customer_buf[i].c_credit[0] = 'G';
                else
                        customer_buf[i].c_credit[0] = 'B';
                customer_buf[i].c_credit[1] = 'C';

                customer_buf[i].c_credit_lim = 50000.0;
                customer_buf[i].c_discount = ((float) RandomNumber(0L,
5000L)) / 10000.0;

                //  fix to avoid ODBC float to numeric conversion problem.

                //  customer_buf[i].c_balance = -10.0;
                strcpy(customer_buf[i].c_balance,"-10.0");

                MakeAlphaString(500, 500, C_DATA_LEN,
customer_buf[i].c_data);

                // Generate HISTORY data
                MakeAlphaString(12, 24, H_DATA_LEN,
customer_buf[i].h_data);

        }
}

//============================================================================
//
// Function   : LoadCustomerTable
//
//============================================================================

void LoadCustomerTable(LOADER_TIME_STRUCT *customer_time_start)
{
        int         i;
    long        c_id;
    short       c_d_id;
    short       c_w_id;
    char        c_first[FIRST_NAME_LEN+1];
    char        c_middle[MIDDLE_NAME_LEN+1];
    char        c_last[LAST_NAME_LEN+1];
    char        c_street_1[ADDRESS_LEN+1];
    char        c_street_2[ADDRESS_LEN+1];
    char        c_city[ADDRESS_LEN+1];
    char        c_state[STATE_LEN+1];
    char        c_zip[ZIP_LEN+1];
    char        c_phone[PHONE_LEN+1];
    char        c_credit[CREDIT_LEN+1];
    double      c_credit_lim;
    double      c_discount;

        //  fix to avoid ODBC float to numeric conversion problem.

        //  double            c_balance;
        char           c_balance[6];

    double      c_ytd_payment;
    short       c_payment_cnt;
    short       c_delivery_cnt;
    char        c_data[C_DATA_LEN+1];
        char           c_since[C_SINCE_LEN+1];
        RETCODE        rc;

    rc = bcp_bind(c_hdbc1, (BYTE *) &c_id, 0, SQL_VARLEN_DATA, NULL, 0,
SQLINT4, 1);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc1);

    rc = bcp_bind(c_hdbc1, (BYTE *) &c_d_id, 0, SQL_VARLEN_DATA, NULL, 0,
SQLINT2, 2);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc1);

        rc = bcp_bind(c_hdbc1, (BYTE *) &c_w_id, 0, SQL_VARLEN_DATA, NULL,
0, SQLINT2, 3);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc1);

    rc = bcp_bind(c_hdbc1, (BYTE *) c_first, 0, FIRST_NAME_LEN, NULL, 0,
0, 4);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc1);

    rc = bcp_bind(c_hdbc1, (BYTE *) c_middle, 0, MIDDLE_NAME_LEN,NULL, 0,
0, 5);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc1);

    rc = bcp_bind(c_hdbc1, (BYTE *) c_last, 0, LAST_NAME_LEN, NULL, 0, 0,
6);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc1);

    rc = bcp_bind(c_hdbc1, (BYTE *) c_street_1, 0, ADDRESS_LEN, NULL, 0,
0, 7);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc1);

    rc = bcp_bind(c_hdbc1, (BYTE *) c_street_2, 0, ADDRESS_LEN, NULL,0,0,
8);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc1);

    rc = bcp_bind(c_hdbc1, (BYTE *) c_city, 0, ADDRESS_LEN, NULL, 0, 0,
9);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc1);

    rc = bcp_bind(c_hdbc1, (BYTE *) c_state, 0, STATE_LEN, NULL, 0, 0,
10);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc1);

    rc = bcp_bind(c_hdbc1, (BYTE *) c_zip, 0, ZIP_LEN, NULL, 0, 0, 11);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc1);

    rc = bcp_bind(c_hdbc1, (BYTE *) c_phone, 0, PHONE_LEN, NULL, 0, 0,
12);
        if (rc != SUCCEED)
```

```
                HandleErrorDBC(c_hdbc1);

        rc = bcp_bind(c_hdbc1, (BYTE *) &c_since, 0, C_SINCE_LEN, NULL, 0,
SQLCHARACTER, 13);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc1);

    rc = bcp_bind(c_hdbc1, (BYTE *) c_credit, 0, CREDIT_LEN, NULL, 0, 0,
14);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc1);

    rc = bcp_bind(c_hdbc1, (BYTE *) &c_credit_lim, 0, SQL_VARLEN_DATA,
NULL, 0, SQLFLT8, 15);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc1);

    rc = bcp_bind(c_hdbc1, (BYTE *) &c_discount, 0, SQL_VARLEN_DATA, NULL,
0, SQLFLT8, 16);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc1);


        //  fix to avoid ODBC float to numeric conversion problem.

    //  rc = bcp_bind(c_hdbc1, (BYTE *) &c_balance, 0, SQL_VARLEN_DATA,
NULL, 0, SQLFLT8, 17);
        //  if (rc != SUCCEED)
        //      HandleErrorDBC(c_hdbc1);
    rc = bcp_bind(c_hdbc1, (BYTE *) c_balance, 0, 5, NULL, 0,
SQLCHARACTER, 17);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc1);


    rc = bcp_bind(c_hdbc1, (BYTE *) &c_ytd_payment, 0, SQL_VARLEN_DATA,
NULL, 0, SQLFLT8, 18);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc1);

    rc = bcp_bind(c_hdbc1, (BYTE *) &c_payment_cnt, 0, SQL_VARLEN_DATA,
NULL, 0, SQLINT2, 19);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc1);

    rc = bcp_bind(c_hdbc1, (BYTE *) &c_delivery_cnt,0, SQL_VARLEN_DATA,
NULL, 0, SQLINT2, 20);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc1);

    rc = bcp_bind(c_hdbc1, (BYTE *) c_data, 0, 500, NULL, 0, 0, 21);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc1);

    for (i = 0; i < customers_per_district; i++)
    {
                c_id = customer_buf[i].c_id;
                c_d_id = customer_buf[i].c_d_id;
                c_w_id = customer_buf[i].c_w_id;

                strcpy(c_first, customer_buf[i].c_first);
                strcpy(c_middle, customer_buf[i].c_middle);
                strcpy(c_last, customer_buf[i].c_last);
                strcpy(c_street_1, customer_buf[i].c_street_1);
                strcpy(c_street_2, customer_buf[i].c_street_2);
                strcpy(c_city, customer_buf[i].c_city);
                strcpy(c_state, customer_buf[i].c_state);
                strcpy(c_zip, customer_buf[i].c_zip);
                strcpy(c_phone, customer_buf[i].c_phone);
                strcpy(c_credit, customer_buf[i].c_credit);

                FormatDate(&c_since);

                c_credit_lim = customer_buf[i].c_credit_lim;
                c_discount = customer_buf[i].c_discount;

                //  fix to avoid ODBC float to numeric conversion problem.

                //  c_balance = customer_buf[i].c_balance;
                strcpy(c_balance, customer_buf[i].c_balance);

                c_ytd_payment = customer_buf[i].c_ytd_payment;
                c_payment_cnt = customer_buf[i].c_payment_cnt;
                c_delivery_cnt = customer_buf[i].c_delivery_cnt;

                strcpy(c_data, customer_buf[i].c_data);

                // Send data to server
                rc = bcp_sendrow(c_hdbc1);
                if (rc != SUCCEED)
                        HandleErrorDBC(c_hdbc1);

                customer_rows_loaded++;
                CheckForCommit(c_hdbc1, c_hstmt1, customer_rows_loaded,
"customer", &customer_time_start->time_start);
    }

}


//============================================================================
//
// Function   : LoadHistoryTable
//
//============================================================================

void LoadHistoryTable(LOADER_TIME_STRUCT *history_time_start)
{
        int         i;
    long        c_id;
    short       c_d_id;
    short       c_w_id;
        double          h_amount;
    char        h_data[H_DATA_LEN+1];
        char            h_date[H_DATE_LEN+1];
        RETCODE         rc;

    rc = bcp_bind(c_hdbc2, (BYTE *) &c_id, 0, SQL_VARLEN_DATA, NULL, 0,
SQLINT4, 1);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc2);
```

```
    rc = bcp_bind(c_hdbc2, (BYTE *) &c_d_id, 0, SQL_VARLEN_DATA, NULL, 0,
SQLINT2, 2);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc2);

    rc = bcp_bind(c_hdbc2, (BYTE *) &c_w_id, 0, SQL_VARLEN_DATA, NULL, 0,
SQLINT2, 3);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc2);

    rc = bcp_bind(c_hdbc2, (BYTE *) &c_d_id, 0, SQL_VARLEN_DATA, NULL, 0,
SQLINT2, 4);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc2);

    rc = bcp_bind(c_hdbc2, (BYTE *) &c_w_id, 0, SQL_VARLEN_DATA, NULL, 0,
SQLINT2, 5);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc2);

        rc = bcp_bind(c_hdbc2, (BYTE *) &h_date, 0, H_DATE_LEN, NULL, 0,
SQLCHARACTER, 6);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc2);

    rc = bcp_bind(c_hdbc2, (BYTE *) &h_amount, 0, SQL_VARLEN_DATA, NULL,
0, SQLFLT8, 7);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc2);

    rc = bcp_bind(c_hdbc2, (BYTE *) h_data, 0, H_DATA_LEN, NULL, 0, 0, 8);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc2);

    for (i = 0; i < customers_per_district; i++)
    {
                c_id = customer_buf[i].c_id;
                c_d_id = customer_buf[i].c_d_id;
                c_w_id = customer_buf[i].c_w_id;
                h_amount = customer_buf[i].h_amount;
                strcpy(h_data, customer_buf[i].h_data);

                FormatDate(&h_date);

                // send to server
                rc = bcp_sendrow(c_hdbc2);
                if (rc != SUCCEED)
                        HandleErrorDBC(c_hdbc2);

                history_rows_loaded++;
                CheckForCommit(c_hdbc2, c_hstmt2, history_rows_loaded,
"history", &history_time_start->time_start);
    }

}


//============================================================-
===============
//
// Function   : LoadOrders
//
//============================================================================
====

void LoadOrders()
{
        LOADER_TIME_STRUCT      orders_time_start;
        LOADER_TIME_STRUCT      new_order_time_start;
        LOADER_TIME_STRUCT      order_line_time_start;
        short                           w_id;
    short                       d_id;
        DWORD                           dwThreadID[MAX_ORDER_THREADS];
        HANDLE                          hThread[MAX_ORDER_THREADS];
        char                            name[20];
        RETCODE                                 rc;
        char                                    bcphint[128];

        // seed with unique number
        seed(6);

        printf("Loading orders...\n");

        // if build index before load...
        if ((aptr->build_index == 1) && (aptr->index_order == 1))
        {
                        BuildIndex("idxordcl");
                        BuildIndex("idxnodcl");
                        BuildIndex("idxodlcl");
        }

        // initialize bulk copy
        sprintf(name, "%s..%s", aptr->database, "orders");

        rc = bcp_init(o_hdbc1, name, NULL, "logs\\orders.err", DB_IN);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc1);

        if ((aptr->build_index == 1) && (aptr->index_order == 1))
        {
                sprintf(bcphint, "tablock, order (o_w_id, o_d_id, o_id),
ROWS_PER_BATCH = %u", (aptr->num_warehouses * 30000));
                rc = bcp_control(o_hdbc1, BCPHINTS, (void*) bcphint);
                if (rc != SUCCEED)
                        HandleErrorDBC(o_hdbc1);
        }

        sprintf(name, "%s..%s", aptr->database, "new_order");

        rc = bcp_init(o_hdbc2, name, NULL, "logs\\neword.err", DB_IN);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc2);

        if ((aptr->build_index == 1) && (aptr->index_order == 1))
        {
                sprintf(bcphint, "tablock, order (no_w_id, no_d_id,
no_o_id), ROWS_PER_BATCH = %u", (aptr->num_warehouses * 9000));
                rc = bcp_control(o_hdbc2, BCPHINTS, (void*) bcphint);
                if (rc != SUCCEED)
                        HandleErrorDBC(o_hdbc2);
        }
```

```
        sprintf(name, "%s..%s", aptr->database, "order_line");

        rc = bcp_init(o_hdbc3, name, NULL, "logs\\ordline.err", DB_IN);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc3);

    if ((aptr->build_index == 1) && (aptr->index_order == 1))
        {
                sprintf(bcphint, "tablock, order (ol_w_id, ol_d_id,
ol_o_id, ol_number), ROWS_PER_BATCH = %u", (aptr->num_warehouses *
300000));
                rc = bcp_control(o_hdbc3, BCPHINTS, (void*) bcphint);
                if (rc != SUCCEED)
                        HandleErrorDBC(o_hdbc3);
        }

        orders_rows_loaded      = 0;
        new_order_rows_loaded   = 0;
        order_line_rows_loaded  = 0;

        OrdersBufInit();

        orders_time_start.time_start = (TimeNow() / MILLI);
        new_order_time_start.time_start = (TimeNow() / MILLI);
        order_line_time_start.time_start = (TimeNow() / MILLI);

        for (w_id = (short)aptr->starting_warehouse; w_id <= aptr-
>num_warehouses; w_id++)
        {
                for (d_id = 1; d_id <= DISTRICT_PER_WAREHOUSE; d_id++)
                {

                        OrdersBufLoad(d_id, w_id);

                        // start parallel loading threads here...

                        // start Orders table thread

                        printf("...Loading Order Table for: d_id = %d, w_id
= %d\n", d_id, w_id);

                        hThread[0] = CreateThread(NULL,
                                                                        0,

(LPTHREAD_START_ROUTINE) LoadOrdersTable,

&orders_time_start,
                                                                        0,

&dwThreadID[0]);

                        if (hThread[0] == NULL)
                        {
                                printf("Error, failed in creating creating
thread = 0.\n");
                                exit(-1);
                        }

                        // start NewOrder table thread

                        printf("...Loading New-Order Table for: d_id = %d,
w_id = %d\n", d_id, w_id);

                        hThread[1] = CreateThread(NULL,
                                                                        0,

(LPTHREAD_START_ROUTINE) LoadNewOrderTable,

&new_order_time_start,
                                                                        0,

&dwThreadID[1]);

                        if (hThread[1] == NULL)
                        {
                                printf("Error, failed in creating creating
thread = 1.\n");
                                exit(-1);
                        }

                        // start Order-Line table thread

                        printf("...Loading Order-Line Table for: d_id = %d,
w_id = %d\n", d_id, w_id);

                        hThread[2] = CreateThread(NULL,
                                                                        0,

(LPTHREAD_START_ROUTINE) LoadOrderLineTable,

&order_line_time_start,
                                                                        0,

&dwThreadID[2]);

                        if (hThread[2] == NULL)
                        {
                                printf("Error, failed in creating creating
thread = 2.\n");
                                exit(-1);
                        }

                        WaitForSingleObject( hThread[0], INFINITE );
                        WaitForSingleObject( hThread[1], INFINITE );
                        WaitForSingleObject( hThread[2], INFINITE );

                        if (CloseHandle(hThread[0]) == FALSE)
                        {
                                printf("Error, failed in closing Orders
thread handle with errno: %d\n", GetLastError());
                        }

                        if (CloseHandle(hThread[1]) == FALSE)
                        {
                                printf("Error, failed in closing NewOrder
thread handle with errno: %d\n", GetLastError());
                        }

                        if (CloseHandle(hThread[2]) == FALSE)
                        {
```

```
                                printf("Error, failed in closing OrderLine
thread handle with errno: %d\n", GetLastError());
                        }

                }
        }

        printf("Finished loading orders.\n");


    return;
}


//==============================================================================
//
// Function   : OrdersBufInit
//
// Clears shared buffer for ORDERS, NEWORDER, and ORDERLINE
//
//==============================================================================

void OrdersBufInit()
{
        int     i;
        int             j;

        for (i=0;i<orders_per_district;i++)
        {
                orders_buf[i].o_id = 0;
                orders_buf[i].o_d_id = 0;
                orders_buf[i].o_w_id = 0;
                orders_buf[i].o_c_id = 0;
                orders_buf[i].o_carrier_id = 0;
                orders_buf[i].o_ol_cnt = 0;
                orders_buf[i].o_all_local = 0;

                for (j=0;j<=14;j++)
                {
                        orders_buf[i].o_ol[j].ol = 0;
                        orders_buf[i].o_ol[j].ol_i_id = 0;
                        orders_buf[i].o_ol[j].ol_supply_w_id = 0;
                        orders_buf[i].o_ol[j].ol_quantity = 0;
                        orders_buf[i].o_ol[j].ol_amount = 0;
                        strcpy(orders_buf[i].o_ol[j].ol_dist_info,"");
                }
        }


}


//==============================================================================
//
// Function   : OrdersBufLoad
//
// Fills shared buffer for ORDERS, NEWORDER, and ORDERLINE
//
//==============================================================================

void OrdersBufLoad(int d_id, int w_id)
{

        int     cust[ORDERS_PER_DIST+1];
        long    o_id;
        short   ol;

        printf("...Loading Order Buffer for: d_id = %d, w_id = %d\n",
                        d_id, w_id);

        GetPermutation(cust, ORDERS_PER_DIST);

        for (o_id=0;o_id<orders_per_district;o_id++)
        {

                // Generate ORDER and NEW-ORDER data

                orders_buf[o_id].o_d_id = d_id;
                orders_buf[o_id].o_w_id = w_id;
                orders_buf[o_id].o_id = o_id+1;
                orders_buf[o_id].o_c_id = cust[o_id+1];
                orders_buf[o_id].o_ol_cnt = (short)RandomNumber(5L, 15L);

                if (o_id < first_new_order)
                {
                        orders_buf[o_id].o_carrier_id =
(short)RandomNumber(1L, 10L);
                        orders_buf[o_id].o_all_local  = 1;
                }
                else
                {
                        orders_buf[o_id].o_carrier_id = 0;
                        orders_buf[o_id].o_all_local  = 1;
                }

                for (ol=0; ol<orders_buf[o_id].o_ol_cnt; ol++)
                {

                        orders_buf[o_id].o_ol[ol].ol = ol+1;
                        orders_buf[o_id].o_ol[ol].ol_i_id =
RandomNumber(1L, max_items);
                        orders_buf[o_id].o_ol[ol].ol_supply_w_id = w_id;
                        orders_buf[o_id].o_ol[ol].ol_quantity = 5;
                        MakeAlphaString(24, 24, OL_DIST_INFO_LEN,
&orders_buf[o_id].o_ol[ol].ol_dist_info);

                        // Generate ORDER-LINE data
                        if (o_id < first_new_order)
                        {
                                orders_buf[o_id].o_ol[ol].ol_amount = 0;
                                // Added to insure ol_delivery_d set
properly during load


        FormatDate(&orders_buf[o_id].o_ol[ol].ol_delivery_d);

                        }
                        else
                        {
                                orders_buf[o_id].o_ol[ol].ol_amount =
RandomNumber(1,999999)/100.0;
```

```
                                // Added to insure ol_delivery_d set
properly during load

                                // odbc datetime format

        strcpy(orders_buf[o_id].o_ol[ol].ol_delivery_d,"1899-12-31
12:00:00.000");

                        }
                }
        }
}


//============================================================================
//
// Function   : LoadOrdersTable
//
//============================================================================

void LoadOrdersTable(LOADER_TIME_STRUCT *orders_time_start)
{
        int         i;
    long        o_id;
        short           o_d_id;
        short           o_w_id;
    long        o_c_id;
    short       o_carrier_id;
    short       o_ol_cnt;
    short       o_all_local;
        char            o_entry_d[O_ENTRY_D_LEN+1];
        RETCODE         rc;
        DBINT           rcint;

        // bind ORDER data
    rc = bcp_bind(o_hdbc1, (BYTE *) &o_id, 0, SQL_VARLEN_DATA, NULL, 0,
SQLINT4, 1);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc1);

    rc = bcp_bind(o_hdbc1, (BYTE *) &o_d_id, 0, SQL_VARLEN_DATA, NULL, 0,
SQLINT2, 2);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc1);

    rc = bcp_bind(o_hdbc1, (BYTE *) &o_w_id, 0, SQL_VARLEN_DATA, NULL, 0,
SQLINT2, 3);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc1);

    rc = bcp_bind(o_hdbc1, (BYTE *) &o_c_id, 0, SQL_VARLEN_DATA, NULL, 0,
SQLINT4, 4);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc1);

        rc = bcp_bind(o_hdbc1, (BYTE *) &o_entry_d, 0, O_ENTRY_D_LEN,
NULL, 0, SQLCHARACTER, 5);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc1);

    rc = bcp_bind(o_hdbc1, (BYTE *) &o_carrier_id, 0, SQL_VARLEN_DATA,
NULL, 0, SQLINT2, 6);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc1);

    rc = bcp_bind(o_hdbc1, (BYTE *) &o_ol_cnt, 0, SQL_VARLEN_DATA, NULL,
0, SQLINT2, 7);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc1);

    rc = bcp_bind(o_hdbc1, (BYTE *) &o_all_local, 0, SQL_VARLEN_DATA,
NULL, 0, SQLINT2, 8);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc1);

    for (i = 0; i < orders_per_district; i++)
    {
                o_id         = orders_buf[i].o_id;
                o_d_id       = orders_buf[i].o_d_id;
                o_w_id       = orders_buf[i].o_w_id;
                o_c_id       = orders_buf[i].o_c_id;
                o_carrier_id = orders_buf[i].o_carrier_id;
                o_ol_cnt     = orders_buf[i].o_ol_cnt;
                o_all_local  = orders_buf[i].o_all_local;

                FormatDate(&o_entry_d);

                // send data to server
                rc = bcp_sendrow(o_hdbc1);
                if (rc != SUCCEED)
                        HandleErrorDBC(o_hdbc1);

                orders_rows_loaded++;
                CheckForCommit(o_hdbc1, o_hstmt1, orders_rows_loaded,
"orders", &orders_time_start->time_start);
    }

        // rcint = bcp_batch(o_hdbc1);
        // if (rcint < 0)
        //      HandleErrorDBC(o_hdbc1);

        if ((o_w_id == aptr->num_warehouses) && (o_d_id == 10))
        {
                rcint = bcp_done(o_hdbc1);
                if (rcint < 0)
                        HandleErrorDBC(o_hdbc1);

                SQLFreeStmt(o_hstmt1, SQL_DROP);
                SQLDisconnect(o_hdbc1);
                SQLFreeConnect(o_hdbc1);

                // if build index after load...
                if ((aptr->build_index == 1) && (aptr->index_order == 0))
                        BuildIndex("idxordcl");

                // build non-clustered index
                if (aptr->build_index == 1)
                        BuildIndex("idxordnc");
        }

}
```

```
//==============================================================================
//
// Function   : LoadNewOrderTable
//
//==============================================================================

void LoadNewOrderTable(LOADER_TIME_STRUCT *new_order_time_start)
{
    int         i;
    long        o_id;
    short       o_d_id;
    short       o_w_id;
        RETCODE         rc;
        DBINT           rcint;

        // Bind NEW-ORDER data

    rc = bcp_bind(o_hdbc2, (BYTE *) &o_id, 0, SQL_VARLEN_DATA, NULL, 0,
SQLINT4, 1);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc2);

    rc = bcp_bind(o_hdbc2, (BYTE *) &o_d_id, 0, SQL_VARLEN_DATA, NULL, 0,
SQLINT2, 2);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc2);

    rc = bcp_bind(o_hdbc2, (BYTE *) &o_w_id, 0, SQL_VARLEN_DATA, NULL, 0,
SQLINT2, 3);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc2);

        for (i = first_new_order; i < last_new_order; i++)
        {
                o_id    = orders_buf[i].o_id;
                o_d_id  = orders_buf[i].o_d_id;
                o_w_id  = orders_buf[i].o_w_id;

                rc = bcp_sendrow(o_hdbc2);
                if (rc != SUCCEED)
                        HandleErrorDBC(o_hdbc2);

                new_order_rows_loaded++;
                CheckForCommit(o_hdbc2, o_hstmt2, new_order_rows_loaded,
"new_order", &new_order_time_start->time_start);
        }

        // rcint = bcp_batch(o_hdbc2);
        // if (rcint < 0)
        //      HandleErrorDBC(o_hdbc2);

        if ((o_w_id == aptr->num_warehouses) && (o_d_id == 10))
        {
                rcint = bcp_done(o_hdbc2);
                if (rcint < 0)
                        HandleErrorDBC(o_hdbc2);

                SQLFreeStmt(o_hstmt2, SQL_DROP);
                SQLDisconnect(o_hdbc2);
                SQLFreeConnect(o_hdbc2);

                // if build index after load...
                if ((aptr->build_index == 1) && (aptr->index_order == 0))
                        BuildIndex("idxnodcl");

        }

}


//==============================================================================
//
// Function   : LoadOrderLineTable
//
//==============================================================================

void LoadOrderLineTable(LOADER_TIME_STRUCT *order_line_time_start)
{
        int         i,j;
    long        o_id;
        short           o_d_id;
        short           o_w_id;
    long        ol;
        long            ol_i_id;
    short       ol_supply_w_id;
    short       ol_quantity;
    double      ol_amount;
    char        ol_dist_info[DIST_INFO_LEN+1];
        char            ol_delivery_d[OL_DELIVERY_D_LEN+1];
        RETCODE         rc;
        DBINT           rcint;

        // bind ORDER-LINE data
    rc = bcp_bind(o_hdbc3, (BYTE *) &o_id, 0, SQL_VARLEN_DATA, NULL, 0,
SQLINT4, 1);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc3);

    rc = bcp_bind(o_hdbc3, (BYTE *) &o_d_id, 0, SQL_VARLEN_DATA, NULL, 0,
SQLINT2, 2);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc3);

    rc = bcp_bind(o_hdbc3, (BYTE *) &o_w_id, 0, SQL_VARLEN_DATA, NULL, 0,
SQLINT2, 3);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc3);

    rc = bcp_bind(o_hdbc3, (BYTE *) &ol, 0, SQL_VARLEN_DATA, NULL, 0,
SQLINT4, 4);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc3);

    rc = bcp_bind(o_hdbc3, (BYTE *) &ol_i_id, 0, SQL_VARLEN_DATA, NULL, 0,
SQLINT4, 5);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc3);

    rc = bcp_bind(o_hdbc3, (BYTE *) &ol_supply_w_id, 0, SQL_VARLEN_DATA,
NULL, 0, SQLINT2, 6);
```

```
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc3);

        rc = bcp_bind(o_hdbc3, (BYTE *) &ol_delivery_d, 0,
OL_DELIVERY_D_LEN, NULL, 0, SQLCHARACTER, 7);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc3);

    rc = bcp_bind(o_hdbc3, (BYTE *) &ol_quantity, 0, SQL_VARLEN_DATA,
NULL, 0, SQLINT2, 8);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc3);

    rc = bcp_bind(o_hdbc3, (BYTE *) &ol_amount, 0, SQL_VARLEN_DATA, NULL,
0, SQLFLT8, 9);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc3);

    rc = bcp_bind(o_hdbc3, (BYTE *) ol_dist_info, 0, DIST_INFO_LEN, NULL,
0, 0, 10);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc3);

        for (i = 0; i < orders_per_district; i++)
    {
                o_id    = orders_buf[i].o_id;
                o_d_id  = orders_buf[i].o_d_id;
                o_w_id  = orders_buf[i].o_w_id;

                for (j=0; j < orders_buf[i].o_ol_cnt; j++)
                {
                        ol              = orders_buf[i].o_ol[j].ol;
                        ol_i_id         = orders_buf[i].o_ol[j].ol_i_id;
                        ol_supply_w_id =
orders_buf[i].o_ol[j].ol_supply_w_id;
                        ol_quantity     = orders_buf[i].o_ol[j].ol_quantity;
                        ol_amount       = orders_buf[i].o_ol[j].ol_amount;


        strcpy(ol_delivery_d,orders_buf[i].o_ol[j].ol_delivery_d);


        strcpy(ol_dist_info,orders_buf[i].o_ol[j].ol_dist_info);

                        rc = bcp_sendrow(o_hdbc3);
                        if (rc != SUCCEED)
                                HandleErrorDBC(o_hdbc3);

                        order_line_rows_loaded++;
                        CheckForCommit(o_hdbc3, o_hstmt3,
order_line_rows_loaded, "order_line", &order_line_time_start->time_start);
                }

        }

        // rcint = bcp_batch(o_hdbc3);
        // if (rcint < 0)
        //      HandleErrorDBC(o_hdbc3);

        if ((o_w_id == aptr->num_warehouses) && (o_d_id == 10))
        {
                rcint = bcp_done(o_hdbc3);
                if (rcint < 0)
                        HandleErrorDBC(o_hdbc3);

                SQLFreeStmt(o_hstmt3, SQL_DROP);
                SQLDisconnect(o_hdbc3);
                SQLFreeConnect(o_hdbc3);

                // if build index after load...
                if ((aptr->build_index == 1) && (aptr->index_order == 0))
                        BuildIndex("idxodlcl");

        }
}


//=============================================================================
//
// Function   : GetPermutation
//
//=============================================================================

void GetPermutation(int perm[], int n)
{
        int i, r, t;

        for (i=1;i<=n;i++)
                perm[i] = i;

        for (i=1;i<=n;i++)
        {
                r = RandomNumber(i,n);
                t = perm[i];
                perm[i] = perm[r];
                perm[r] = t;
        }

}


//=============================================================================
//
// Function   : CheckForCommit
//
//=============================================================================

void CheckForCommit(HDBC hdbc,
                                        HSTMT hstmt,
                                int rows_loaded,
                                        char *table_name,
                                long *time_start)
{

    long       time_end, time_diff;
       // DBINT       rcint;

    if ( !(rows_loaded % aptr->batch) )
    {
                // rcint = bcp_batch(hdbc);
```

```
                // if (rcint < 0)
                //      HandleErrorDBC(hdbc);

                time_end = (TimeNow() / MILLI);
                time_diff = time_end - *time_start;

                printf("-> Loaded %ld rows into %s in %ld sec - Total = %d
(%.2f rps)\n",
                        aptr->batch,
                        table_name,
                                time_diff,
                        rows_loaded,
                                (float) aptr->batch / (time_diff ? time_diff
: 1L));

                *time_start = time_end;
    }

    return;
}


//========================================================================
//
// Function   : OpenConnections
//
//========================================================================

void OpenConnections()
{

        RETCODE         rc;

        char                    szDriverString[300];
        char                    szDriverStringOut[1024];
        SQLSMALLINT             cbDriverStringOut;


        SQLAllocHandle(SQL_HANDLE_ENV, SQL_NULL_HANDLE, &henv );

        SQLSetEnvAttr(henv, SQL_ATTR_ODBC_VERSION, (void*)SQL_OV_ODBC3, 0
);

        SQLAllocHandle(SQL_HANDLE_DBC, henv , &i_hdbc1);
        SQLAllocHandle(SQL_HANDLE_DBC, henv , &w_hdbc1);
        SQLAllocHandle(SQL_HANDLE_DBC, henv , &c_hdbc1);
        SQLAllocHandle(SQL_HANDLE_DBC, henv , &c_hdbc2);
        SQLAllocHandle(SQL_HANDLE_DBC, henv , &o_hdbc1);
        SQLAllocHandle(SQL_HANDLE_DBC, henv , &o_hdbc2);
        SQLAllocHandle(SQL_HANDLE_DBC, henv , &o_hdbc3);

        SQLSetConnectAttr(i_hdbc1, SQL_COPT_SS_BCP, (void *)SQL_BCP_ON,
SQL_IS_INTEGER );
        SQLSetConnectAttr(w_hdbc1, SQL_COPT_SS_BCP, (void *)SQL_BCP_ON,
SQL_IS_INTEGER );
        SQLSetConnectAttr(c_hdbc1, SQL_COPT_SS_BCP, (void *)SQL_BCP_ON,
SQL_IS_INTEGER );
        SQLSetConnectAttr(c_hdbc2, SQL_COPT_SS_BCP, (void *)SQL_BCP_ON,
SQL_IS_INTEGER );
        SQLSetConnectAttr(o_hdbc1, SQL_COPT_SS_BCP, (void *)SQL_BCP_ON,
SQL_IS_INTEGER );
        SQLSetConnectAttr(o_hdbc2, SQL_COPT_SS_BCP, (void *)SQL_BCP_ON,
SQL_IS_INTEGER );
        SQLSetConnectAttr(o_hdbc3, SQL_COPT_SS_BCP, (void *)SQL_BCP_ON,
SQL_IS_INTEGER );

        // Open connections to SQL Server

        // Connection 1

        sprintf( szDriverString , "DRIVER={SQL
Server};SERVER=%s;UID=%s;PWD=%s;DATABASE=%s" ,
                                                aptr->server,
                                                aptr->user,
                                                aptr->password,
                                                aptr->database );

        rc = SQLSetConnectOption (i_hdbc1, SQL_PACKET_SIZE, aptr-
>pack_size);
        if (rc != SUCCEED)
                HandleErrorDBC(i_hdbc1);

        rc = SQLDriverConnect ( i_hdbc1,
                                                NULL,
                                                    (SQLCHAR*)&szDriverString[0]
,
                                                SQL_NTS,

        (SQLCHAR*)&szDriverStringOut[0],
                                                sizeof(szDriverStringOut),
                                                &cbDriverStringOut,
                                                SQL_DRIVER_NOPROMPT );
        if (rc != SUCCEED)
                HandleErrorDBC(i_hdbc1);

        // Connection 2

        sprintf( szDriverString , "DRIVER={SQL
Server};SERVER=%s;UID=%s;PWD=%s;DATABASE=%s" ,
                                                aptr->server,
                                                aptr->user,
                                                aptr->password,
                                                aptr->database );

        rc = SQLSetConnectOption (w_hdbc1, SQL_PACKET_SIZE, aptr-
>pack_size);
        if (rc != SUCCEED)
                HandleErrorDBC(w_hdbc1);

        rc = SQLDriverConnect ( w_hdbc1,
                                                        NULL,

        (SQLCHAR*)&szDriverString[0] ,
                                                        SQL_NTS,

        (SQLCHAR*)&szDriverStringOut[0],

        sizeof(szDriverStringOut),
                                                        &cbDriverStringOut,
                                                        SQL_DRIVER_NOPROMPT
);
        if (rc != SUCCEED)
```

```
                HandleErrorDBC(w_hdbc1);

        // Connection 3

        sprintf( szDriverString , "DRIVER={SQL
Server};SERVER=%s;UID=%s;PWD=%s;DATABASE=%s" ,
                                                aptr->server,
                                                aptr->user,
                                                aptr->password,
                                                aptr->database );

        rc = SQLSetConnectOption (c_hdbc1, SQL_PACKET_SIZE, aptr-
>pack_size);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc1);

        rc = SQLDriverConnect ( c_hdbc1,
                                                NULL,

        (SQLCHAR*)&szDriverString[0] ,
                                                SQL_NTS,

        (SQLCHAR*)&szDriverStringOut[0],

        sizeof(szDriverStringOut),
                                                &cbDriverStringOut,
                                                SQL_DRIVER_NOPROMPT
);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc1);

        // Connection 4

        sprintf( szDriverString , "DRIVER={SQL
Server};SERVER=%s;UID=%s;PWD=%s;DATABASE=%s" ,
                                                aptr->server,
                                                aptr->user,
                                                aptr->password,
                                                aptr->database );

        rc = SQLSetConnectOption (c_hdbc2, SQL_PACKET_SIZE, aptr-
>pack_size);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc2);

        rc = SQLDriverConnect ( c_hdbc2,
                                                NULL,

        (SQLCHAR*)&szDriverString[0] ,
                                                SQL_NTS,

        (SQLCHAR*)&szDriverStringOut[0],

        sizeof(szDriverStringOut),
                                                &cbDriverStringOut,
                                                SQL_DRIVER_NOPROMPT
);
        if (rc != SUCCEED)
                HandleErrorDBC(c_hdbc2);

        // Connection 5

        sprintf( szDriverString , "DRIVER={SQL
Server};SERVER=%s;UID=%s;PWD=%s;DATABASE=%s" ,
                                                aptr->server,
                                                aptr->user,
                                                aptr->password,
                                                aptr->database );

        rc = SQLSetConnectOption (o_hdbc1, SQL_PACKET_SIZE, aptr-
>pack_size);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc1);

        rc = SQLDriverConnect ( o_hdbc1,
                                                NULL,

        (SQLCHAR*)&szDriverString[0] ,
                                                SQL_NTS,

        (SQLCHAR*)&szDriverStringOut[0],

        sizeof(szDriverStringOut),
                                                &cbDriverStringOut,
                                                SQL_DRIVER_NOPROMPT
);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc1);

        // Connection 6

        sprintf( szDriverString , "DRIVER={SQL
Server};SERVER=%s;UID=%s;PWD=%s;DATABASE=%s" ,
                                                aptr->server,
                                                aptr->user,
                                                aptr->password,
                                                aptr->database );

        rc = SQLSetConnectOption (o_hdbc2, SQL_PACKET_SIZE, aptr-
>pack_size);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc2);

        rc = SQLDriverConnect ( o_hdbc2,
                                                NULL,

        (SQLCHAR*)&szDriverString[0] ,
                                                SQL_NTS,

        (SQLCHAR*)&szDriverStringOut[0],

        sizeof(szDriverStringOut),
                                                &cbDriverStringOut,
                                                SQL_DRIVER_NOPROMPT
);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc2);

        // Connection 7

        sprintf( szDriverString , "DRIVER={SQL
Server};SERVER=%s;UID=%s;PWD=%s;DATABASE=%s" ,
```

```
                                                aptr->server,
                                                aptr->user,
                                                aptr->password,
                                                aptr->database );

        rc = SQLSetConnectOption (o_hdbc3, SQL_PACKET_SIZE, aptr-
>pack_size);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc3);

        rc = SQLDriverConnect ( o_hdbc3,
                                                        NULL,

        (SQLCHAR*)&szDriverString[0] ,
                                                        SQL_NTS,

        (SQLCHAR*)&szDriverStringOut[0],

        sizeof(szDriverStringOut),
                                                        &cbDriverStringOut,
                                                        SQL_DRIVER_NOPROMPT
);
        if (rc != SUCCEED)
                HandleErrorDBC(o_hdbc3);

}

//========================================================================
//
// Function name: BuildIndex
//
//========================================================================

void BuildIndex(char   *index_script)
{
        char    cmd[256];

        printf("Starting index creation:  %s\n",index_script);

        sprintf(cmd, "isql -S%s -U%s -P%s -e -i%s\\%s.sql > logs\\%s.log",
                                aptr->server,
                                aptr->user,
                                aptr->password,
                                aptr->index_script_path,
                                index_script,
                                index_script);

        system(cmd);

        printf("Finished index creation:  %s\n",index_script);
}


void HandleErrorDBC (SQLHDBC  hdbc1)
{

        SQLCHAR        SqlState[6], Msg[SQL_MAX_MESSAGE_LENGTH];
        SQLINTEGER  NativeError;
        SQLSMALLINT i, MsgLen;
        SQLRETURN   rc2;
        char           timebuf[128];
        char           datebuf[128];
        FILE           *fp1;

        i = 1;
        while (( rc2 = SQLGetDiagRec(SQL_HANDLE_DBC , hdbc1, i, SqlState ,
&NativeError,
                                Msg, sizeof(Msg) , &MsgLen )) !=
SQL_NO_DATA )
        {

                sprintf( szLastError , "%s" ,  Msg );

                _strtime(timebuf);
                _strdate(datebuf);

                printf( "[%s : %s] %s\n" , datebuf, timebuf, szLastError);

                fp1 = fopen("logs\\tpccldr.err","w");
                if (fp1 == NULL)
                        printf("ERROR:  Unable to open errorlog file.\n");
                else
                {
                        fprintf(fp1, "[%s : %s] %s\n" , datebuf, timebuf,
szLastError);
                        fclose(fp1);
                }

                i++;

        }
}


void FormatDate ( char* szTimeCOutput )
{

        struct tm when;
        time_t now;

        time( &now );
        when  = *localtime( &now );

        mktime( &when );

        // odbc datetime format
        strftime( szTimeCOutput , 30 , "%Y-%m-%d %H:%M:%S.000", &when );

        return;

}
```

Appendix C - Tunable Parameters

Microsoft SQL Server Startup Parameters

C:\MSSQL\BINN\SQLSERVR.EXE -c -x -t3502 -g38

Where:

- -c Start SQL Server independently of the Service Control Manager
- -x Disables the keeping of CPU time and cache hit ratio statistics
- -t3502 Writes a message to the SQL Server Errorlog showing the beginning and ending time of each checkpoint
- -g38 Specifies the amount of virtual address space, in MB, SQL Server will leave available for memory allocations, excluding the buffer pool and thread stacks, such as dynamically-loaded DLLs, extended procedure calls, etc.. If this option is not specified, SQL Server will use a value that is suitable for a wide range of runtime environments. Use of this option may be appropriate in 2GB (3GB Enterprise Edition) configurations in which the memory usage requirements of SQL Server are atypical and the virtual address space of the SQL Server process is totally in use. Incorrect use of this option can lead to conditions under which SQL Server may not start or may encounter runtime errors.

SQL Server Stack Size

The default stack size for Microsoft SQL Server 7.0 was changed using the EDITBIN utility. The EDITBIN utility ships with Microsoft Visual C++ V4.0. The command used to change the stack size is:

editbin /S: 131072 sqlservr.exe

This command is fully documented as an article in the Microsoft Knowledge Base on the Microsoft Web Site at www.microsoft.com/support.

BOOT.INI

The /3gb switch was added to the boot.ini file to cause Windows NT Enterprise Edition to allow 3GB of user and 1GB of kernel virtual address space, rather than the usual 2GB of virtual address space for each.

Microsoft SQL Server Configuration Parameters

```
1> 2> 3> 4> 5> 6> 7> 8> 9> 10> 11>
--  File:     VERSION.SQL
--            Microsoft TPC-C Benchmark Kit Ver. 4.00
--            Copyright Microsoft, 1996
--  Purpose:  Returns SQL Server version string



print " "
select convert(char(30), getdate(),9)
print " "

 ------------------------------
 Mar  1 1999  8:39:55:373AM

(1 row affected)

1> 2> 3>
select @@version




 --------------------------------------------------------------------------
-----
       ------------------------------------------------------------------
-----
       ------------------------------------------------------------------
-----
       ----------------------------------
 Microsoft SQL Server  7.00 - 7.00.623 (Intel X86)
       Nov 13 1998 02:37:14
       Cop
       yright (c) 1988-1998 Microsoft Corporation
       Enterprise Edition on Windo
       ws NT 4.0 (Build 1381: Service Pack 4)
```

```
(1 row affected)
1> 2>
1> 2> 3> 4> 5> 6> 7> 8> 9> 10>
--  File:     CONFIG.SQL
--            Microsoft TPC-C Benchmark Kit Ver. 4.00
--            Copyright Microsoft, 1996
--  Purpose:  Collects SQL Server configuration parameters


print " "
select convert(char(30), getdate(),9)
print " "

 ------------------------------
 Mar  1 1999  8:39:57:310AM

(1 row affected)

1> 2> 3> DBCC execution completed. If DBCC printed error messages, contact
your system administrator.
Configuration option changed. Run the RECONFIGURE statement to install.

sp_configure "show advanced",1
1> 2> reconfigure with override
1> 2> sp_configure
 name
minimum     maximum     config_value run_value
 ------------------------------------------------------------------------ --
--------- ----------- ------------ -----------
 affinity mask
0  2147483647           15           15
 allow updates
0           1            1            1
 cost threshold for parallelism
0       32767            5            5
 cursor threshold
-1  2147483647           -1           -1
 default language
0        9999            0            0
 default sortorder id
0         255           50           50
 extended memory size (MB)
0  2147483647            0            0
 fill factor (%)
0         100            0            0
 index create memory (KB)
704     1600000              0            0
 language in cache
3         100            3            3
 language neutral full-text
0           1            0            0
 lightweight pooling
0           1            1            1
 locks
5000  2147483647         8000         8000
 max async IO
1         255          255          255
 max degree of parallelism
0          32            1            1
 max server memory (MB)
4  2147483647         2950         2950
 max text repl size (B)
0  2147483647        65536        65536
 max worker threads
10        1024          237          237
 media retention
0         365            0            0
 min memory per query (KB)
512  2147483647          512          512
 min server memory (MB)
0  2147483647         2950         2950
 nested triggers
0           1            0            0
 network packet size (B)
512       65535          4096         4096
 open objects
0  2147483647            0            0
 priority boost
0           1            1            1
 query governor cost limit
0  2147483647            0            0
 query wait (s)
-1  2147483647           -1           -1
 recovery interval (min)
0       32767        32767        32767
 remote access
0           1            0            0
 remote login timeout (s)
0  2147483647            5            5
 remote proc trans
0           1            0            0
 remote query timeout (s)
0  2147483647            0            0
 resource timeout (s)
5  2147483647           10           10
 scan for startup procs
0           1            0            0
 set working set size
0           1            1            1
 show advanced options
0           1            1            1
 spin counter
1  2147483647        10000        10000
 time slice (ms)
50        1000          100          100
 two digit year cutoff
1753        9999         2049         2049
 Unicode comparison style
0  2147483647            0            0
 Unicode locale id
0  2147483647        33280        33280
 user connections
0       32767            0            0
 user options
0        4095            0            0

1>
```

Internal RAID Configuration Parameters

```
Adapter #0

Number of Logical Drives : 1

Logical Drive = 0
        Span Depth = 4
        Raid Level = 0,
        Read Ahead = 0
        Stripe Size = 64KB,
        Status = 2
        Write Policy = 0,
        Direct IO = 1,
        Number of Stripes = 8
        SPAN Number = 0
                Starting Block = 0
                Number of blocks = 8953856
                Device Number = 0
                        Channel Number = 0
                        Target Number = 0
                Device Number = 1
                        Channel Number = 1
                        Target Number = 0
                Device Number = 2
                        Channel Number = 2
                        Target Number = 0
                Device Number = 3
                        Channel Number = 0
                        Target Number = 1
                Device Number = 4
                        Channel Number = 1
                        Target Number = 1
                Device Number = 5
                        Channel Number = 2
                        Target Number = 1
                Device Number = 6
                        Channel Number = 0
                        Target Number = 2
                Device Number = 7
                        Channel Number = 1
                        Target Number = 2
        SPAN Number = 1
                Starting Block = 0
                Number of blocks = 17913856
                Device Number = 0
                        Channel Number = 0
                        Target Number = 3
                Device Number = 1
                        Channel Number = 1
                        Target Number = 3
                Device Number = 2
                        Channel Number = 2
                        Target Number = 2
                Device Number = 3
                        Channel Number = 0
                        Target Number = 4
                Device Number = 4
                        Channel Number = 1
                        Target Number = 4
                Device Number = 5
                        Channel Number = 2
                        Target Number = 3
                Device Number = 6
                        Channel Number = 0
                        Target Number = 5
                Device Number = 7
                        Channel Number = 1
                        Target Number = 5
        SPAN Number = 2
                Starting Block = 0
                Number of blocks = 17913856
                Device Number = 0
                        Channel Number = 0
                        Target Number = 6
                Device Number = 1
                        Channel Number = 1
                        Target Number = 6
                Device Number = 2
                        Channel Number = 2
                        Target Number = 4
                Device Number = 3
                        Channel Number = 0
                        Target Number = 8
                Device Number = 4
                        Channel Number = 1
                        Target Number = 8
                Device Number = 5
                        Channel Number = 2
                        Target Number = 5
                Device Number = 6
                        Channel Number = 0
                        Target Number = 9
                Device Number = 7
                        Channel Number = 1
                        Target Number = 9
        SPAN Number = 3
                Starting Block = 0
                Number of blocks = 17913856
                Device Number = 0
                        Channel Number = 0
                        Target Number = 10
                Device Number = 1
                        Channel Number = 1
                        Target Number = 10
                Device Number = 2
                        Channel Number = 2
                        Target Number = 6
                Device Number = 3
                        Channel Number = 0
                        Target Number = 11
                Device Number = 4
                        Channel Number = 1
                        Target Number = 11
                Device Number = 5
                        Channel Number = 0
                        Target Number = 12
```

```
                Device Number = 6
                        Channel Number = 1
                        Target Number = 12
                Device Number = 7
                        Channel Number = 0
                        Target Number = 13

Physical Drive = 0 (Channel 0, ID 0)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 1 (Channel 0, ID 1)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 2 (Channel 0, ID 2)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 3 (Channel 0, ID 3)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 4 (Channel 0, ID 4)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 5 (Channel 0, ID 5)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 6 (Channel 0, ID 6)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 8 (Channel 0, ID 8)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 9 (Channel 0, ID 9)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 10 (Channel 0, ID 10)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 11 (Channel 0, ID 11)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 12 (Channel 0, ID 12)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 13 (Channel 0, ID 13)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 15 (Channel 1, ID 0)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 16 (Channel 1, ID 1)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 17 (Channel 1, ID 2)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 18 (Channel 1, ID 3)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 19 (Channel 1, ID 4)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 20 (Channel 1, ID 5)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 21 (Channel 1, ID 6)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 23 (Channel 1, ID 8)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 24 (Channel 1, ID 9)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 25 (Channel 1, ID 10)
```

```
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 26 (Channel 1, ID 11)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 27 (Channel 1, ID 12)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 30 (Channel 2, ID 0)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 31 (Channel 2, ID 1)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 32 (Channel 2, ID 2)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 33 (Channel 2, ID 3)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 34 (Channel 2, ID 4)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 35 (Channel 2, ID 5)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 36 (Channel 2, ID 6)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks


Adapter #1

Number of Logical Drives : 1

Logical Drive = 0
        Span Depth = 1
        Raid Level = 1,
        Read Ahead = 0
        Stripe Size = 64KB,
        Status = 2
        Write Policy = 0,
        Direct IO = 1,
        Number of Stripes = 2
        SPAN Number = 0
                Starting Block = 0
                Number of blocks = 143331328
                Device Number = 0
                        Channel Number = 0
                        Target Number = 0
                Device Number = 1
                        Channel Number = 1
                        Target Number = 0

Physical Drive = 0 (Channel 0, ID 0)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 143331328 blocks

Physical Drive = 15 (Channel 1, ID 0)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 143331328 blocks


Adapter #2

Number of Logical Drives : 1

Logical Drive = 0
        Span Depth = 4
        Raid Level = 0,
        Read Ahead = 0
        Stripe Size = 64KB,
        Status = 2
        Write Policy = 0,
        Direct IO = 1,
        Number of Stripes = 8
        SPAN Number = 0
                Starting Block = 0
                Number of blocks = 8953856
                Device Number = 0
                        Channel Number = 0
                        Target Number = 0
                Device Number = 1
                        Channel Number = 1
                        Target Number = 0
                Device Number = 2
                        Channel Number = 2
                        Target Number = 0
                Device Number = 3
                        Channel Number = 0
                        Target Number = 1
                Device Number = 4
                        Channel Number = 1
                        Target Number = 1
                Device Number = 5
                        Channel Number = 2
                        Target Number = 1
```

```
        Device Number = 6
                Channel Number = 0
                Target Number = 2
        Device Number = 7
                Channel Number = 1
                Target Number = 2
SPAN Number = 1
        Starting Block = 0
        Number of blocks = 17913856
        Device Number = 0
                Channel Number = 0
                Target Number = 3
        Device Number = 1
                Channel Number = 1
                Target Number = 3
        Device Number = 2
                Channel Number = 2
                Target Number = 2
        Device Number = 3
                Channel Number = 0
                Target Number = 4
        Device Number = 4
                Channel Number = 1
                Target Number = 4
        Device Number = 5
                Channel Number = 2
                Target Number = 3
        Device Number = 6
                Channel Number = 0
                Target Number = 5
        Device Number = 7
                Channel Number = 1
                Target Number = 5
SPAN Number = 2
        Starting Block = 0
        Number of blocks = 17913856
        Device Number = 0
                Channel Number = 0
                Target Number = 6
        Device Number = 1
                Channel Number = 1
                Target Number = 6
        Device Number = 2
                Channel Number = 2
                Target Number = 4
        Device Number = 3
                Channel Number = 0
                Target Number = 8
        Device Number = 4
                Channel Number = 1
                Target Number = 8
        Device Number = 5
                Channel Number = 2
                Target Number = 5
        Device Number = 6
                Channel Number = 0
                Target Number = 9
        Device Number = 7
                Channel Number = 1
                Target Number = 9
SPAN Number = 3
        Starting Block = 0
        Number of blocks = 17913856
        Device Number = 0
                Channel Number = 0
                Target Number = 10
        Device Number = 1
                Channel Number = 1
                Target Number = 10
        Device Number = 2
                Channel Number = 2
                Target Number = 6
        Device Number = 3
                Channel Number = 0
                Target Number = 11
        Device Number = 4
                Channel Number = 1
                Target Number = 11
        Device Number = 5
                Channel Number = 0
                Target Number = 12
        Device Number = 6
                Channel Number = 1
                Target Number = 12
        Device Number = 7
                Channel Number = 0
                Target Number = 13

Physical Drive = 0 (Channel 0, ID 0)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 1 (Channel 0, ID 1)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 2 (Channel 0, ID 2)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 3 (Channel 0, ID 3)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 4 (Channel 0, ID 4)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 5 (Channel 0, ID 5)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks
```

```
Physical Drive = 6 (Channel 0, ID 6)
       Type = 0,      Current Status = 3
       Tag Depth = 0
       Size 17913856 blocks

Physical Drive = 8 (Channel 0, ID 8)
       Type = 0,      Current Status = 3
       Tag Depth = 0
       Size 17913856 blocks

Physical Drive = 9 (Channel 0, ID 9)
       Type = 0,      Current Status = 3
       Tag Depth = 0
       Size 17913856 blocks

Physical Drive = 10 (Channel 0, ID 10)
       Type = 0,      Current Status = 3
       Tag Depth = 0
       Size 17913856 blocks

Physical Drive = 11 (Channel 0, ID 11)
       Type = 0,      Current Status = 3
       Tag Depth = 0
       Size 17913856 blocks

Physical Drive = 12 (Channel 0, ID 12)
       Type = 0,      Current Status = 3
       Tag Depth = 0
       Size 17913856 blocks

Physical Drive = 13 (Channel 0, ID 13)
       Type = 0,      Current Status = 3
       Tag Depth = 0
       Size 17913856 blocks

Physical Drive = 15 (Channel 1, ID 0)
       Type = 0,      Current Status = 3
       Tag Depth = 0
       Size 8953856 blocks

Physical Drive = 16 (Channel 1, ID 1)
       Type = 0,      Current Status = 3
       Tag Depth = 0
       Size 8953856 blocks

Physical Drive = 17 (Channel 1, ID 2)
       Type = 0,      Current Status = 3
       Tag Depth = 0
       Size 8953856 blocks

Physical Drive = 18 (Channel 1, ID 3)
       Type = 0,      Current Status = 3
       Tag Depth = 0
       Size 17913856 blocks

Physical Drive = 19 (Channel 1, ID 4)
       Type = 0,      Current Status = 3
       Tag Depth = 0
       Size 17913856 blocks

Physical Drive = 20 (Channel 1, ID 5)
       Type = 0,      Current Status = 3
       Tag Depth = 0
       Size 17913856 blocks

Physical Drive = 21 (Channel 1, ID 6)
       Type = 0,      Current Status = 3
       Tag Depth = 0
       Size 17913856 blocks

Physical Drive = 23 (Channel 1, ID 8)
       Type = 0,      Current Status = 3
       Tag Depth = 0
       Size 17913856 blocks

Physical Drive = 24 (Channel 1, ID 9)
       Type = 0,      Current Status = 3
       Tag Depth = 0
       Size 17913856 blocks

Physical Drive = 25 (Channel 1, ID 10)
       Type = 0,      Current Status = 3
       Tag Depth = 0
       Size 17913856 blocks

Physical Drive = 26 (Channel 1, ID 11)
       Type = 0,      Current Status = 3
       Tag Depth = 0
       Size 17913856 blocks

Physical Drive = 27 (Channel 1, ID 12)
       Type = 0,      Current Status = 3
       Tag Depth = 0
       Size 17913856 blocks

Physical Drive = 30 (Channel 2, ID 0)
       Type = 0,      Current Status = 3
       Tag Depth = 0
       Size 8953856 blocks

Physical Drive = 31 (Channel 2, ID 1)
       Type = 0,      Current Status = 3
       Tag Depth = 0
       Size 8953856 blocks

Physical Drive = 32 (Channel 2, ID 2)
       Type = 0,      Current Status = 3
       Tag Depth = 0
       Size 17913856 blocks

Physical Drive = 33 (Channel 2, ID 3)
       Type = 0,      Current Status = 3
       Tag Depth = 0
       Size 17913856 blocks

Physical Drive = 34 (Channel 2, ID 4)
       Type = 0,      Current Status = 3
       Tag Depth = 0
```

```
        Size 17913856 blocks

Physical Drive = 35 (Channel 2, ID 5)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 36 (Channel 2, ID 6)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Adapter #3

Number of Logical Drives : 1

Logical Drive = 0
        Span Depth = 4
        Raid Level = 0,
        Read Ahead = 0
        Stripe Size = 64KB,
        Status = 2
        Write Policy = 0,
        Direct IO = 1,
        Number of Stripes = 8
        SPAN Number = 0
                Starting Block = 0
                Number of blocks = 8953856
                Device Number = 0
                        Channel Number = 0
                        Target Number = 0
                Device Number = 1
                        Channel Number = 1
                        Target Number = 0
                Device Number = 2
                        Channel Number = 2
                        Target Number = 0
                Device Number = 3
                        Channel Number = 0
                        Target Number = 1
                Device Number = 4
                        Channel Number = 1
                        Target Number = 1
                Device Number = 5
                        Channel Number = 2
                        Target Number = 1
                Device Number = 6
                        Channel Number = 0
                        Target Number = 2
                Device Number = 7
                        Channel Number = 1
                        Target Number = 2
        SPAN Number = 1
                Starting Block = 0
                Number of blocks = 17913856
                Device Number = 0
                        Channel Number = 0
                        Target Number = 3
                Device Number = 1
                        Channel Number = 1
                        Target Number = 3
                Device Number = 2
                        Channel Number = 2
                        Target Number = 2
                Device Number = 3
                        Channel Number = 0
                        Target Number = 4
                Device Number = 4
                        Channel Number = 1
                        Target Number = 4
                Device Number = 5
                        Channel Number = 2
                        Target Number = 3
                Device Number = 6
                        Channel Number = 0
                        Target Number = 5
                Device Number = 7
                        Channel Number = 1
                        Target Number = 5
        SPAN Number = 2
                Starting Block = 0
                Number of blocks = 17913856
                Device Number = 0
                        Channel Number = 0
                        Target Number = 6
                Device Number = 1
                        Channel Number = 1
                        Target Number = 6
                Device Number = 2
                        Channel Number = 2
                        Target Number = 4
                Device Number = 3
                        Channel Number = 0
                        Target Number = 8
                Device Number = 4
                        Channel Number = 1
                        Target Number = 8
                Device Number = 5
                        Channel Number = 2
                        Target Number = 5
                Device Number = 6
                        Channel Number = 0
                        Target Number = 9
                Device Number = 7
                        Channel Number = 1
                        Target Number = 9
        SPAN Number = 3
                Starting Block = 0
                Number of blocks = 17913856
                Device Number = 0
                        Channel Number = 0
                        Target Number = 10
                Device Number = 1
                        Channel Number = 1
                        Target Number = 10
                Device Number = 2
                        Channel Number = 2
                        Target Number = 6
```

```
                Device Number = 3
                        Channel Number = 0
                        Target Number = 11
                Device Number = 4
                        Channel Number = 1
                        Target Number = 11
                Device Number = 5
                        Channel Number = 0
                        Target Number = 12
                Device Number = 6
                        Channel Number = 1
                        Target Number = 12
                Device Number = 7
                        Channel Number = 0
                        Target Number = 13

Physical Drive = 0 (Channel 0, ID 0)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 1 (Channel 0, ID 1)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 2 (Channel 0, ID 2)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 3 (Channel 0, ID 3)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 4 (Channel 0, ID 4)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 5 (Channel 0, ID 5)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 6 (Channel 0, ID 6)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 8 (Channel 0, ID 8)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 9 (Channel 0, ID 9)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 10 (Channel 0, ID 10)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 11 (Channel 0, ID 11)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 12 (Channel 0, ID 12)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 13 (Channel 0, ID 13)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 15 (Channel 1, ID 0)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 16 (Channel 1, ID 1)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 17 (Channel 1, ID 2)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 18 (Channel 1, ID 3)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 19 (Channel 1, ID 4)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 20 (Channel 1, ID 5)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 21 (Channel 1, ID 6)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 23 (Channel 1, ID 8)
        Type = 0,       Current Status = 3
```

```
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 24 (Channel 1, ID 9)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 25 (Channel 1, ID 10)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 26 (Channel 1, ID 11)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 27 (Channel 1, ID 12)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 30 (Channel 2, ID 0)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 31 (Channel 2, ID 1)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 32 (Channel 2, ID 2)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 33 (Channel 2, ID 3)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 34 (Channel 2, ID 4)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 35 (Channel 2, ID 5)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 36 (Channel 2, ID 6)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks
```

```
Adapter #4

Number of Logical Drives : 1

Logical Drive = 0
        Span Depth = 4
        Raid Level = 0,
        Read Ahead = 0
        Stripe Size = 64KB,
        Status = 2
        Write Policy = 0,
        Direct IO = 1,
        Number of Stripes = 8
        SPAN Number = 0
                Starting Block = 0
                Number of blocks = 8953856
                Device Number = 0
                        Channel Number = 0
                        Target Number = 0
                Device Number = 1
                        Channel Number = 1
                        Target Number = 0
                Device Number = 2
                        Channel Number = 2
                        Target Number = 0
                Device Number = 3
                        Channel Number = 0
                        Target Number = 1
                Device Number = 4
                        Channel Number = 1
                        Target Number = 1
                Device Number = 5
                        Channel Number = 2
                        Target Number = 1
                Device Number = 6
                        Channel Number = 0
                        Target Number = 2
                Device Number = 7
                        Channel Number = 1
                        Target Number = 2
        SPAN Number = 1
                Starting Block = 0
                Number of blocks = 17913856
                Device Number = 0
                        Channel Number = 0
                        Target Number = 3
                Device Number = 1
                        Channel Number = 1
                        Target Number = 3
                Device Number = 2
                        Channel Number = 2
                        Target Number = 2
                Device Number = 3
                        Channel Number = 0
                        Target Number = 4
                Device Number = 4
                        Channel Number = 1
                        Target Number = 4
                Device Number = 5
```

```
                Channel Number = 2
                Target Number = 3
        Device Number = 6
                Channel Number = 0
                Target Number = 5
        Device Number = 7
                Channel Number = 1
                Target Number = 5
SPAN Number = 2
        Starting Block = 0
        Number of blocks = 17913856
        Device Number = 0
                Channel Number = 0
                Target Number = 6
        Device Number = 1
                Channel Number = 1
                Target Number = 6
        Device Number = 2
                Channel Number = 2
                Target Number = 4
        Device Number = 3
                Channel Number = 0
                Target Number = 8
        Device Number = 4
                Channel Number = 1
                Target Number = 8
        Device Number = 5
                Channel Number = 2
                Target Number = 5
        Device Number = 6
                Channel Number = 0
                Target Number = 9
        Device Number = 7
                Channel Number = 1
                Target Number = 9
SPAN Number = 3
        Starting Block = 0
        Number of blocks = 17913856
        Device Number = 0
                Channel Number = 0
                Target Number = 10
        Device Number = 1
                Channel Number = 1
                Target Number = 10
        Device Number = 2
                Channel Number = 2
                Target Number = 6
        Device Number = 3
                Channel Number = 0
                Target Number = 11
        Device Number = 4
                Channel Number = 1
                Target Number = 11
        Device Number = 5
                Channel Number = 0
                Target Number = 12
        Device Number = 6
                Channel Number = 1
                Target Number = 12
        Device Number = 7
                Channel Number = 0
                Target Number = 13

Physical Drive = 0 (Channel 0, ID 0)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 1 (Channel 0, ID 1)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 2 (Channel 0, ID 2)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 3 (Channel 0, ID 3)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 4 (Channel 0, ID 4)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 5 (Channel 0, ID 5)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 6 (Channel 0, ID 6)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 8 (Channel 0, ID 8)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 9 (Channel 0, ID 9)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 10 (Channel 0, ID 10)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 11 (Channel 0, ID 11)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks
```

```
Physical Drive = 12 (Channel 0, ID 12)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 13 (Channel 0, ID 13)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 15 (Channel 1, ID 0)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 16 (Channel 1, ID 1)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 17 (Channel 1, ID 2)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 18 (Channel 1, ID 3)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 19 (Channel 1, ID 4)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 20 (Channel 1, ID 5)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 21 (Channel 1, ID 6)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 23 (Channel 1, ID 8)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 24 (Channel 1, ID 9)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 25 (Channel 1, ID 10)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 26 (Channel 1, ID 11)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 27 (Channel 1, ID 12)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 30 (Channel 2, ID 0)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 31 (Channel 2, ID 1)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 32 (Channel 2, ID 2)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 33 (Channel 2, ID 3)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 34 (Channel 2, ID 4)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 35 (Channel 2, ID 5)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 36 (Channel 2, ID 6)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks


Adapter #5

Number of Logical Drives : 1

Logical Drive = 0
        Span Depth = 4
        Raid Level = 0,
        Read Ahead = 0
        Stripe Size = 64KB,
        Status = 2
        Write Policy = 0,
        Direct IO = 1,
```

```
Number of Stripes = 8
SPAN Number = 0
        Starting Block = 0
        Number of blocks = 8953856
        Device Number = 0
                Channel Number = 0
                Target Number = 0
        Device Number = 1
                Channel Number = 1
                Target Number = 0
        Device Number = 2
                Channel Number = 2
                Target Number = 0
        Device Number = 3
                Channel Number = 0
                Target Number = 1
        Device Number = 4
                Channel Number = 1
                Target Number = 1
        Device Number = 5
                Channel Number = 2
                Target Number = 1
        Device Number = 6
                Channel Number = 0
                Target Number = 2
        Device Number = 7
                Channel Number = 1
                Target Number = 2
SPAN Number = 1
        Starting Block = 0
        Number of blocks = 17913856
        Device Number = 0
                Channel Number = 0
                Target Number = 3
        Device Number = 1
                Channel Number = 1
                Target Number = 3
        Device Number = 2
                Channel Number = 2
                Target Number = 2
        Device Number = 3
                Channel Number = 0
                Target Number = 4
        Device Number = 4
                Channel Number = 1
                Target Number = 4
        Device Number = 5
                Channel Number = 2
                Target Number = 3
        Device Number = 6
                Channel Number = 0
                Target Number = 5
        Device Number = 7
                Channel Number = 1
                Target Number = 5
SPAN Number = 2
        Starting Block = 0
        Number of blocks = 17913856
        Device Number = 0
                Channel Number = 0
                Target Number = 6
        Device Number = 1
                Channel Number = 1
                Target Number = 6
        Device Number = 2
                Channel Number = 2
                Target Number = 4
        Device Number = 3
                Channel Number = 0
                Target Number = 8
        Device Number = 4
                Channel Number = 1
                Target Number = 8
        Device Number = 5
                Channel Number = 2
                Target Number = 5
        Device Number = 6
                Channel Number = 0
                Target Number = 9
        Device Number = 7
                Channel Number = 1
                Target Number = 9
SPAN Number = 3
        Starting Block = 0
        Number of blocks = 17913856
        Device Number = 0
                Channel Number = 0
                Target Number = 10
        Device Number = 1
                Channel Number = 1
                Target Number = 10
        Device Number = 2
                Channel Number = 2
                Target Number = 6
        Device Number = 3
                Channel Number = 0
                Target Number = 11
        Device Number = 4
                Channel Number = 1
                Target Number = 11
        Device Number = 5
                Channel Number = 0
                Target Number = 12
        Device Number = 6
                Channel Number = 1
                Target Number = 12
        Device Number = 7
                Channel Number = 0
                Target Number = 13

Physical Drive = 0 (Channel 0, ID 0)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 1 (Channel 0, ID 1)
        Type = 0,       Current Status = 3
        Tag Depth = 0
```

```
        Size 8953856 blocks

Physical Drive = 2 (Channel 0, ID 2)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 3 (Channel 0, ID 3)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 4 (Channel 0, ID 4)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 5 (Channel 0, ID 5)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 6 (Channel 0, ID 6)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 8 (Channel 0, ID 8)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 9 (Channel 0, ID 9)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 10 (Channel 0, ID 10)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 11 (Channel 0, ID 11)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 12 (Channel 0, ID 12)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 13 (Channel 0, ID 13)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 15 (Channel 1, ID 0)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 16 (Channel 1, ID 1)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 17 (Channel 1, ID 2)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 18 (Channel 1, ID 3)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 19 (Channel 1, ID 4)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 20 (Channel 1, ID 5)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 21 (Channel 1, ID 6)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 23 (Channel 1, ID 8)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 24 (Channel 1, ID 9)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 25 (Channel 1, ID 10)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 26 (Channel 1, ID 11)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 27 (Channel 1, ID 12)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 30 (Channel 2, ID 0)
```

```
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 31 (Channel 2, ID 1)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 32 (Channel 2, ID 2)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 33 (Channel 2, ID 3)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 34 (Channel 2, ID 4)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 35 (Channel 2, ID 5)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 36 (Channel 2, ID 6)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks


Adapter #6

Number of Logical Drives : 1

Logical Drive = 0
        Span Depth = 4
        Raid Level = 0,
        Read Ahead = 0
        Stripe Size = 64KB,
        Status = 2
        Write Policy = 0,
        Direct IO = 1,
        Number of Stripes = 8
        SPAN Number = 0
                Starting Block = 0
                Number of blocks = 8953856
                Device Number = 0
                        Channel Number = 0
                        Target Number = 0
                Device Number = 1
                        Channel Number = 1
                        Target Number = 0
                Device Number = 2
                        Channel Number = 2
                        Target Number = 0
                Device Number = 3
                        Channel Number = 0
                        Target Number = 1
                Device Number = 4
                        Channel Number = 1
                        Target Number = 1
                Device Number = 5
                        Channel Number = 2
                        Target Number = 1
                Device Number = 6
                        Channel Number = 0
                        Target Number = 2
                Device Number = 7
                        Channel Number = 1
                        Target Number = 2
        SPAN Number = 1
                Starting Block = 0
                Number of blocks = 17913856
                Device Number = 0
                        Channel Number = 0
                        Target Number = 3
                Device Number = 1
                        Channel Number = 1
                        Target Number = 3
                Device Number = 2
                        Channel Number = 2
                        Target Number = 2
                Device Number = 3
                        Channel Number = 0
                        Target Number = 4
                Device Number = 4
                        Channel Number = 1
                        Target Number = 4
                Device Number = 5
                        Channel Number = 2
                        Target Number = 3
                Device Number = 6
                        Channel Number = 0
                        Target Number = 5
                Device Number = 7
                        Channel Number = 1
                        Target Number = 5
        SPAN Number = 2
                Starting Block = 0
                Number of blocks = 17913856
                Device Number = 0
                        Channel Number = 0
                        Target Number = 6
                Device Number = 1
                        Channel Number = 1
                        Target Number = 6
                Device Number = 2
                        Channel Number = 2
                        Target Number = 4
                Device Number = 3
                        Channel Number = 0
                        Target Number = 8
                Device Number = 4
```

```
                        Channel Number = 1
                        Target Number = 8
                Device Number = 5
                        Channel Number = 2
                        Target Number = 5
                Device Number = 6
                        Channel Number = 0
                        Target Number = 9
                Device Number = 7
                        Channel Number = 1
                        Target Number = 9
        SPAN Number = 3
                Starting Block = 0
                Number of blocks = 17913856
                Device Number = 0
                        Channel Number = 0
                        Target Number = 10
                Device Number = 1
                        Channel Number = 1
                        Target Number = 10
                Device Number = 2
                        Channel Number = 2
                        Target Number = 6
                Device Number = 3
                        Channel Number = 0
                        Target Number = 11
                Device Number = 4
                        Channel Number = 1
                        Target Number = 11
                Device Number = 5
                        Channel Number = 0
                        Target Number = 12
                Device Number = 6
                        Channel Number = 1
                        Target Number = 12
                Device Number = 7
                        Channel Number = 0
                        Target Number = 13

Physical Drive = 0 (Channel 0, ID 0)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 1 (Channel 0, ID 1)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 2 (Channel 0, ID 2)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 3 (Channel 0, ID 3)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 4 (Channel 0, ID 4)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 5 (Channel 0, ID 5)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 6 (Channel 0, ID 6)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 8 (Channel 0, ID 8)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 9 (Channel 0, ID 9)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 10 (Channel 0, ID 10)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 11 (Channel 0, ID 11)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 12 (Channel 0, ID 12)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 13 (Channel 0, ID 13)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 15 (Channel 1, ID 0)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 16 (Channel 1, ID 1)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 17 (Channel 1, ID 2)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks
```

```
Physical Drive = 18 (Channel 1, ID 3)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 19 (Channel 1, ID 4)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 20 (Channel 1, ID 5)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 21 (Channel 1, ID 6)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 23 (Channel 1, ID 8)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 24 (Channel 1, ID 9)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 25 (Channel 1, ID 10)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 26 (Channel 1, ID 11)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 27 (Channel 1, ID 12)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 30 (Channel 2, ID 0)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 31 (Channel 2, ID 1)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 32 (Channel 2, ID 2)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 33 (Channel 2, ID 3)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 34 (Channel 2, ID 4)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 35 (Channel 2, ID 5)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 36 (Channel 2, ID 6)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks


Adapter #7

Number of Logical Drives : 1

Logical Drive = 0
        Span Depth = 4
        Raid Level = 0,
        Read Ahead = 0
        Stripe Size = 64KB,
        Status = 2
        Write Policy = 0,
        Direct IO = 1,
        Number of Stripes = 8
        SPAN Number = 0
                Starting Block = 0
                Number of blocks = 8953856
                Device Number = 0
                        Channel Number = 0
                        Target Number = 0
                Device Number = 1
                        Channel Number = 1
                        Target Number = 0
                Device Number = 2
                        Channel Number = 2
                        Target Number = 0
                Device Number = 3
                        Channel Number = 0
                        Target Number = 1
                Device Number = 4
                        Channel Number = 1
                        Target Number = 1
                Device Number = 5
                        Channel Number = 2
                        Target Number = 1
                Device Number = 6
                        Channel Number = 0
```

```
                Target Number = 2
        Device Number = 7
                Channel Number = 1
                Target Number = 2
SPAN Number = 1
        Starting Block = 0
        Number of blocks = 17913856
        Device Number = 0
                Channel Number = 0
                Target Number = 3
        Device Number = 1
                Channel Number = 1
                Target Number = 3
        Device Number = 2
                Channel Number = 2
                Target Number = 2
        Device Number = 3
                Channel Number = 0
                Target Number = 4
        Device Number = 4
                Channel Number = 1
                Target Number = 4
        Device Number = 5
                Channel Number = 2
                Target Number = 3
        Device Number = 6
                Channel Number = 0
                Target Number = 5
        Device Number = 7
                Channel Number = 1
                Target Number = 5
SPAN Number = 2
        Starting Block = 0
        Number of blocks = 17913856
        Device Number = 0
                Channel Number = 0
                Target Number = 6
        Device Number = 1
                Channel Number = 1
                Target Number = 6
        Device Number = 2
                Channel Number = 2
                Target Number = 4
        Device Number = 3
                Channel Number = 0
                Target Number = 8
        Device Number = 4
                Channel Number = 1
                Target Number = 8
        Device Number = 5
                Channel Number = 2
                Target Number = 5
        Device Number = 6
                Channel Number = 0
                Target Number = 9
        Device Number = 7
                Channel Number = 1
                Target Number = 9
SPAN Number = 3
        Starting Block = 0
        Number of blocks = 17913856
        Device Number = 0
                Channel Number = 0
                Target Number = 10
        Device Number = 1
                Channel Number = 1
                Target Number = 10
        Device Number = 2
                Channel Number = 2
                Target Number = 6
        Device Number = 3
                Channel Number = 0
                Target Number = 11
        Device Number = 4
                Channel Number = 1
                Target Number = 11
        Device Number = 5
                Channel Number = 0
                Target Number = 12
        Device Number = 6
                Channel Number = 1
                Target Number = 12
        Device Number = 7
                Channel Number = 0
                Target Number = 13

Physical Drive = 0 (Channel 0, ID 0)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 1 (Channel 0, ID 1)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 2 (Channel 0, ID 2)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 3 (Channel 0, ID 3)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 4 (Channel 0, ID 4)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 5 (Channel 0, ID 5)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 6 (Channel 0, ID 6)
        Type = 0,       Current Status = 3
```

```
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 8 (Channel 0, ID 8)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 9 (Channel 0, ID 9)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 10 (Channel 0, ID 10)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 11 (Channel 0, ID 11)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 12 (Channel 0, ID 12)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 13 (Channel 0, ID 13)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 15 (Channel 1, ID 0)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 16 (Channel 1, ID 1)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 17 (Channel 1, ID 2)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 18 (Channel 1, ID 3)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 19 (Channel 1, ID 4)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 20 (Channel 1, ID 5)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 21 (Channel 1, ID 6)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 23 (Channel 1, ID 8)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 24 (Channel 1, ID 9)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 25 (Channel 1, ID 10)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 26 (Channel 1, ID 11)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 27 (Channel 1, ID 12)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 30 (Channel 2, ID 0)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 31 (Channel 2, ID 1)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 8953856 blocks

Physical Drive = 32 (Channel 2, ID 2)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 33 (Channel 2, ID 3)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks

Physical Drive = 34 (Channel 2, ID 4)
        Type = 0,       Current Status = 3
        Tag Depth = 0
        Size 17913856 blocks
```

```
Physical Drive = 35 (Channel 2, ID 5)
       Type = 0,      Current Status = 3
       Tag Depth = 0
       Size 17913856 blocks

Physical Drive = 36 (Channel 2, ID 6)
       Type = 0,      Current Status = 3
       Tag Depth = 0
       Size 17913856 blocks
```

External RAID Configuration Parameters

```
************************************************************************
*          Unisys Ultra-Wide RAID Controller   OSM1000-C32             *
************************************************************************

CPU type:      5x86-133 (WB)

Firmware version 1.31G
Bootcode version 1.12B

Total cache:   32 MB

- Cache        Write Back:           enabled
               optimization:         sequential (128K stripe size)

- Raid         Rebuild Priority:     low
               Write Priority        on Initialization:    disabled
                                     on Rebuild:           disabled
                                     on Normal:            disabled

Logical Volume Partition table

       Volume ID1     Capacity 69987 MB      RAID 0         # drives: 4

Host LUN Assignment

       SCSI Chl       LUN     LVIDx   PortIdx   Capacity
           0           0       0         0     69987 MB

Physical Drives

       Slot    Chl    Id     Capacity   Status   XferRate    Vendor/Product
Id              Firmware
               0      0    17497 MB    online   41.7 MB     UNISYS
014228ST118202LC    B603
               0      1    17497 MB    online   41.7 MB     UNISYS
014228ST118202LC    B603
               0      2    17497 MB    online   41.7 MB     UNISYS
014228ST118202LC    B603
               0      3    17497 MB    online   41.7 MB     UNISYS
014228ST118202LC    B603
```

Configuration of Log Drives

A single AMI 438-H RAID controller was used in the SUT for the mirrored log drives. Half of the drives were in one disk cage connected to one channel of the controller and half were in a second disk cage connected to a second channel of the controller. The controller implemented the RAID 1 mirorring across the two channels. Write caching was disabled on both the controller and on all the physical drives themselves.

One OSM1000-100 SCSI-to-SCSI RAID controller was used in each of the two log disk cages. Each of these controllers implemented RAID 0 striping on the four 18GB drives that were in each disk cage, so that the AMI controller in the SUT saw just two large 'disks'. Each of the OSM1000-100 controllers had a 32MB cache. Configuration options were set for Write Back caching and Optimized for Sequential IO. The OSM1000-100 controllers used an algorithm that ensured that cached write data was held for no more than a fraction of a minute before being written to the physical drives.

For the priced configuration, each of the disk cages contained two redundant power supplies. Only one was required to be functional to keep the OSM1000-100 controller and disk drives operational. A UPS was priced to provide power to one power supply in each disk cage. The second power supply in each disk cage was connected to normal wall power. Thus neither interruption of power or failure of the UPS would affect the two log disk cages (or their OSM1000-100 controllers and disks). Since the two disk cages were completely independent of each other, this configuration ensured that there was no single point of failure in writing to the log.

NT Server Configuration Information

```
Microsoft Diagnostics Report For \\AVALON4
------------------------------------------------------------------------

OS Version Report
------------------------------------------------------------------------
Microsoft (R) Windows NT (TM) Server
Version 4.0 (Build 1381: Service Pack 4) x86 Multiprocessor Free
Registered Owner: SAM&M, Unisys Corporation
Product Number: 70234-810-6895975-67328
------------------------------------------------------------------------

System Report
------------------------------------------------------------------------
System: AT/AT COMPATIBLE
Hardware Abstraction Layer: MPS 1.4 - APIC platform
BIOS Date: 01/28/99
BIOS Version: AD450NX - PhoenixBIOS 4.0 Releas

Processor list:
```

```
   0:  x86 Family 6 Model 7 Stepping 2 GenuineIntel ~500 Mhz
   1:  x86 Family 6 Model 7 Stepping 2 GenuineIntel ~500 Mhz
   2:  x86 Family 6 Model 7 Stepping 2 GenuineIntel ~500 Mhz
   3:  x86 Family 6 Model 7 Stepping 2 GenuineIntel ~500 Mhz
------------------------------------------------------------------------

Video Display Report
------------------------------------------------------------------------
BIOS Date: 05/29/98
BIOS Version: CL-GD5446 PCI VGA BIOS Version 1.35

Adapter:
   Setting: 1024 x 768 x 256
            75 Hz
   Type: cirrus compatible display adapter
   String: Cirrus Logic Compatible
   Memory: 2 MB
   Chip Type: Cirrus Logic 5446
   DAC Type: Integrated RAMDAC
Driver:
   Vendor: Microsoft Corporation
   File(s): cirrus.sys, vga.dll, cirrus.dll, vga256.dll, vga64K.dll
   Version: 4.00, 4.0.0


Drives Report
------------------------------------------------------------------------
C:\  (Local - FAT) SYSTEM Total: 2,096,160 KB, Free: 908,416 KB
   Serial Number: F035 - 8AA4
   Bytes per cluster: 512
   Sectors per cluster: 64
   Filename length: 255
T:\  (Local - NTFS) BACK1 Total: 225,504,252 KB, Free: 73,055,344 KB
   Serial Number: 5CFC - 3A73
   Bytes per cluster: 512
   Sectors per cluster: 8
   Filename length: 255
U:\  (Local - NTFS) BACK2 Total: 225,504,252 KB, Free: 73,055,360 KB
   Serial Number: 8C0A - C67A
   Bytes per cluster: 512
   Sectors per cluster: 8
   Filename length: 255
V:\  (Local - NTFS) BACK3 Total: 225,504,252 KB, Free: 73,055,344 KB
   Serial Number: A825 - AE7B
   Bytes per cluster: 512
   Sectors per cluster: 8
   Filename length: 255
Z:\  (Local - NTFS) testfiles Total: 2,345,488 KB, Free: 707,348 KB
   Serial Number: B0C5 - 33C8
   Bytes per cluster: 512
   Sectors per cluster: 8
   Filename length: 255

Memory Report
------------------------------------------------------------------------
Handles: 1,133
Threads: 126
Processes: 16

Physical Memory (K)
   Total: 4,095,372
   Available: 3,745,224
   File Cache: 137,424

Kernel Memory (K)
   Total: 164,276
   Paged: 156,812
   Nonpaged: 7,464

Commit Charge (K)
   Total: 224,128
   Limit: 4,590,976
   Peak: 224,828

Pagefile Space (K)
   Total: 655,360
   Total in use: 29,144
   Peak: 29,920

   C:\pagefile.sys
      Total: 524,288
      Total in use: 14,484
      Peak: 14,904

   Z:\pagefile.sys
      Total: 131,072
      Total in use: 14,660
      Peak: 15,016



Services Report
------------------------------------------------------------------------
Alerter                                          Stopped   (Manual)
   C:\WINNT\System32\services.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Shared Process
   Service Dependencies:
      LanmanWorkstation
Computer Browser                                 Stopped   (Manual)
   C:\WINNT\System32\services.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Shared Process
   Service Dependencies:
      LanmanWorkstation
      LanmanServer
      LmHosts
ClipBook Server                                  Stopped   (Manual)
   C:\WINNT\system32\clipsrv.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process
   Service Dependencies:
      NetDDE
PCI Hot Plug Service                             Stopped   (Disabled)
   C:\WINNT\System32\cpqphps.exe
```

```
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process
DHCP Client (TDI)                          Stopped   (Disabled)
   C:\WINNT\System32\services.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Shared Process
   Service Dependencies:
      Tcpip
      Afd
      NetBT
EventLog (Event log)                       Running   (Automatic)
   C:\WINNT\system32\services.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Shared Process
Server                                     Running   (Automatic)
   C:\WINNT\System32\services.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Shared Process
   Group Dependencies:
      TDI
Workstation (NetworkProvider)              Running   (Automatic)
   C:\WINNT\System32\services.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Shared Process
   Group Dependencies:
      TDI
License Logging Service                    Stopped   (Manual)
   C:\WINNT\System32\llssrv.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process
TCP/IP NetBIOS Helper                      Stopped   (Manual)
   C:\WINNT\System32\services.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Shared Process
   Group Dependencies:
      NetworkProvider
Messenger                                  Stopped   (Manual)
   C:\WINNT\System32\services.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Shared Process
   Service Dependencies:
      LanmanWorkstation
      NetBios
MSDTC (MS Transactions)                    Stopped   (Manual)
   C:\WINNT\System32\msdtc.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process
   Service Dependencies:
      RPCSS
      NTLMSSP
MSSQLServer                                Stopped   (Manual)
   C:\MSSQL7\binn\sqlservr.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process
Network DDE (NetDDEGroup)                  Stopped   (Disabled)
   C:\WINNT\system32\netdde.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Shared Process
   Service Dependencies:
      NetDDEDSDM
Network DDE DSDM                           Stopped   (Disabled)
   C:\WINNT\system32\netdde.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Shared Process
Net Logon (RemoteValidation)               Stopped   (Manual)
   C:\WINNT\System32\lsass.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Shared Process
   Service Dependencies:
      LanmanWorkstation
      LmHosts
NT LM Security Support Provider            Stopped   (Manual)
   C:\WINNT\System32\SERVICES.EXE
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Shared Process
Plug and Play (PlugPlay)                   Stopped   (Manual)
   C:\WINNT\system32\services.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Shared Process
Protected Storage                          Running   (Automatic)
   C:\WINNT\System32\pstores.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process, Interactive
   Service Dependencies:
      RpcSs
Directory Replicator                       Stopped   (Manual)
   C:\WINNT\System32\lmrepl.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process
   Service Dependencies:
      LanmanWorkstation
      LanmanServer
Remote Procedure Call (RPC) Locator        Stopped   (Manual)
   C:\WINNT\System32\LOCATOR.EXE
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process
   Service Dependencies:
      LanmanWorkstation
      Rdr
Remote Procedure Call (RPC) Service        Running   (Manual)
```

```
   C:\WINNT\system32\RpcSs.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process
Schedule                                    Stopped   (Manual)
   C:\WINNT\System32\AtSvc.Exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process
SNMP                                        Stopped   (Disabled)
   C:\WINNT\System32\snmp.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process
   Service Dependencies:
      Tcpip
      EventLog
SNMP Trap Service                           Stopped   (Disabled)
   C:\WINNT\System32\snmptrap.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process
   Service Dependencies:
      Tcpip
      EventLog
Spooler (SpoolerGroup)                      Stopped   (Manual)
   C:\WINNT\system32\spoolss.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process, Interactive
SQLServerAgent                              Stopped   (Manual)
   C:\MSSQL7\binn\sqlagent.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process
   Service Dependencies:
      MSSQLServer
Telephony Service                           Stopped   (Manual)
   C:\WINNT\system32\tapisrv.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process
UPS                                         Stopped   (Manual)
   C:\WINNT\System32\ups.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process



Drivers Report
--------------------------------------------------------------------------
Abiosdsk (Primary disk)                     Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
AFD Networking Support Environment (TDI)    Running   (Automatic)
   C:\WINNT\System32\drivers\afd.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Aha154x (SCSI miniport)                     Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Aha174x (SCSI miniport)                     Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
aic78xx (SCSI miniport)                     Running   (Boot)
   C:\WINNT\System32\DRIVERS\aic78xx.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Always (SCSI miniport)                      Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
ami0nt (SCSI miniport)                      Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
amsint (SCSI miniport)                      Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Arrow (SCSI miniport)                       Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
atapi (SCSI miniport)                       Stopped   (Boot)
   C:\WINNT\System32\DRIVERS\atapi.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Atdisk (Primary disk)                       Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
ati (Video)                                 Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Beep (Base)                                 Running   (System)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
BusLogic (SCSI miniport)                    Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Busmouse (Pointer Port)                     Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Cdaudio (Filter)                            Stopped   (System)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Cdfs (File system)                          Running   (Disabled)
   Error Severity: Normal
   Service Flags: File System Driver, Shared Process
   Group Dependencies:
      SCSI CDROM Class
Cdrom (SCSI CDROM Class)                    Running   (System)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
   Group Dependencies:
      SCSI miniport
Changer (Filter)                            Stopped   (System)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
cirrus (Video)                              Running   (System)
   Error Severity: Normal
```

```
   Service Flags: Kernel Driver, Shared Process
Cpqarray (SCSI miniport)                    Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
cpqfws2e (SCSI miniport)                    Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
dac960nt (SCSI miniport)                    Stopped   (Boot)
   C:\WINNT\System32\drivers\dac960nt.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
dce376nt (SCSI miniport)                    Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Delldsa (SCSI miniport)                     Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Dell_DGX (Video)                            Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Disk (SCSI Class)                           Running   (Boot)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
   Group Dependencies:
      SCSI miniport
Diskperf (Filter)                           Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
DptScsi (SCSI miniport)                     Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
dtc329x (SCSI miniport)                     Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Intel(R) PRO NDIS Driver (NDIS)             Running   (Automatic)
   C:\WINNT\System32\drivers\E100BNT.SYS
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
em (Base)                                   Stopped   (Manual)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
et4000 (Video)                              Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Fastfat (Boot file system)                  Running   (Disabled)
   Error Severity: Normal
   Service Flags: File System Driver, Shared Process
Fd16_700 (SCSI miniport)                    Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Fd7000ex (SCSI miniport)                    Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Fd8xx (SCSI miniport)                       Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
flashpnt (SCSI miniport)                    Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Floppy (Primary disk)                       Running   (System)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Ftdisk (Filter)                             Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
gamdrv (SCSI Class)                         Stopped   (Manual)
   C:\WINNT\System32\drivers\gamdrv.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
PCI Hot Plug Driver                         Stopped   (Disabled)
   System32\DRIVERS\hotplug.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
i8042 Keyboard and PS/2 Mouse Port Driver (Keyboard Port) Running
(System)
   System32\DRIVERS\i8042prt.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Inport (Pointer Port)                       Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Jazzg300 (Video)                            Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Jazzg364 (Video)                            Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Jzvxl484 (Video)                            Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Keyboard Class Driver (Keyboard Class)      Running   (System)
   System32\DRIVERS\kbdclass.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
KSecDD (Base)                               Running   (System)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
macdisk (Filter)                            Stopped   (Boot)
   C:\WINNT\System32\drivers\macdisk.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
megaraid (SCSI Miniport)                    Stopped   (Disabled)
   System32\drivers\megaraid.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
mga (Video)                                 Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
mga_mil (Video)                             Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
mitsumi (SCSI miniport)                     Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
mkecr5xx (SCSI miniport)                    Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Modem (Extended base)                       Stopped   (Manual)
```

```
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Mouse Class Driver (Pointer Class)            Running   (System)
   System32\DRIVERS\mouclass.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
mraid (Primary disk)                          Running   (Boot)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
mraid35x (Primary disk)                       Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Msfs (File system)                            Running   (System)
   Error Severity: Normal
   Service Flags: File System Driver, Shared Process
Mup (Network)                                 Running   (Manual)
   C:\WINNT\System32\drivers\mup.sys
   Error Severity: Normal
   Service Flags: File System Driver, Shared Process
NetBEUI Protocol (PNP_TDI)                    Running   (Automatic)
   C:\WINNT\System32\drivers\nbf.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Ncr53c9x (SCSI miniport)                      Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
ncr77c22 (Video)                              Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Ncrc700 (SCSI miniport)                       Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Ncrc710 (SCSI miniport)                       Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Microsoft NDIS System Driver (NDIS)           Running   (System)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
NetBIOS Interface (NetBIOSGroup)              Stopped   (Manual)
   C:\WINNT\System32\drivers\netbios.sys
   Error Severity: Normal
   Service Flags: File System Driver, Shared Process
   Group Dependencies:
      TDI
WINS Client(TCP/IP) (PNP_TDI)                 Stopped   (Disabled)
   C:\WINNT\System32\drivers\netbt.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
   Service Dependencies:
      Tcpip
NetDetect                                     Stopped   (Manual)
   C:\WINNT\system32\drivers\netdtect.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Npfs (File system)                            Running   (System)
   Error Severity: Normal
   Service Flags: File System Driver, Shared Process
Ntfs (File system)                            Running   (Disabled)
   Error Severity: Normal
   Service Flags: File System Driver, Shared Process
Null (Base)                                   Running   (System)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Oliscsi (SCSI miniport)                       Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Parallel (Extended base)                      Stopped   (Manual)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
   Service Dependencies:
      Parport
   Group Dependencies:
      Parallel arbitrator
Parport (Parallel arbitrator)                 Stopped   (Manual)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
ParVdm (Extended base)                        Stopped   (Manual)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
   Service Dependencies:
      Parport
   Group Dependencies:
      Parallel arbitrator
PCIDump (PCI Configuration)                   Stopped   (System)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Pcmcia (System Bus Extender)                  Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
PnP ISA Enabler Driver (Base)                 Stopped   (System)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
PortFltr (port)                               Stopped   (Manual)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
   Group Dependencies:
      SCSI miniport
psidisp (Video)                               Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Ql10wnt (SCSI miniport)                       Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
qv (Video)                                    Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Rdr (Network)                                 Running   (Manual)
   C:\WINNT\System32\drivers\rdr.sys
   Error Severity: Normal
   Service Flags: File System Driver, Shared Process
s3 (Video)                                    Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Scsiprnt (Extended base)                      Stopped   (Automatic)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
   Group Dependencies:
      SCSI miniport
```

```
Scsiscan (SCSI Class)                          Running   (System)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
   Group Dependencies:
      SCSI miniport
Serial (Extended base)                         Running   (Automatic)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Sermouse (Pointer Port)                        Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Sfloppy (Primary disk)                         Stopped   (System)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
   Group Dependencies:
      SCSI miniport
Simbad (Filter)                                Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
slcd32 (SCSI miniport)                         Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Sparrow (SCSI miniport)                        Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Spock (SCSI miniport)                          Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Srv (Network)                                  Running   (Manual)
   C:\WINNT\System32\drivers\srv.sys
   Error Severity: Normal
   Service Flags: File System Driver, Shared Process
symc810 (SCSI miniport)                        Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Symc8XX (SCSI Miniport)                        Stopped   (Boot)
   C:\WINNT\System32\drivers\Symc8XX.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Sym_hi (SCSI Miniport)                         Stopped   (Boot)
   C:\WINNT\System32\drivers\Sym_hi.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Sysdrv (Extended Base)                         Stopped   (Manual)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
T128 (SCSI miniport)                           Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
T13B (SCSI miniport)                           Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
TCP/IP Service (PNP_TDI)                       Running   (Automatic)
   C:\WINNT\System32\drivers\tcpip.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
tga (Video)                                    Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
tmv1 (SCSI miniport)                           Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Ultra124 (SCSI miniport)                       Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Ultra14f (SCSI miniport)                       Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Ultra24f (SCSI miniport)                       Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
update (Base)                                  Stopped   (System)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
v7vram (Video)                                 Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
VgaSave (Video Save)                           Stopped   (System)
   C:\WINNT\System32\drivers\vga.sys
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
VgaStart (Video Init)                          Stopped   (System)
   C:\WINNT\System32\drivers\vga.sys
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Wd33c93 (SCSI miniport)                        Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
wd90c24a (Video)                               Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
wdvga (Video)                                  Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
weitekp9 (Video)                               Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Xga (Video)                                    Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
```

IRQ and Port Report

Devices	Vector	Level	Affinity
MPS 1.4 - APIC platform	8	8	0x0000000f
MPS 1.4 - APIC platform	0	0	0x0000000f
MPS 1.4 - APIC platform	1	1	0x0000000f
MPS 1.4 - APIC platform	2	2	0x0000000f
MPS 1.4 - APIC platform	3	3	0x0000000f
MPS 1.4 - APIC platform	4	4	0x0000000f
MPS 1.4 - APIC platform	5	5	0x0000000f
MPS 1.4 - APIC platform	6	6	0x0000000f
MPS 1.4 - APIC platform	7	7	0x0000000f
MPS 1.4 - APIC platform	8	8	0x0000000f
MPS 1.4 - APIC platform	9	9	0x0000000f

```
MPS 1.4 - APIC platform          10    10 0x0000000f
MPS 1.4 - APIC platform          11    11 0x0000000f
MPS 1.4 - APIC platform          12    12 0x0000000f
MPS 1.4 - APIC platform          13    13 0x0000000f
MPS 1.4 - APIC platform          14    14 0x0000000f
MPS 1.4 - APIC platform          15    15 0x0000000f
MPS 1.4 - APIC platform          16    16 0x0000000f
MPS 1.4 - APIC platform          17    17 0x0000000f
MPS 1.4 - APIC platform          18    18 0x0000000f
MPS 1.4 - APIC platform          19    19 0x0000000f
MPS 1.4 - APIC platform          20    20 0x0000000f
MPS 1.4 - APIC platform          21    21 0x0000000f
MPS 1.4 - APIC platform          22    22 0x0000000f
MPS 1.4 - APIC platform          23    23 0x0000000f
MPS 1.4 - APIC platform          24    24 0x0000000f
MPS 1.4 - APIC platform          25    25 0x0000000f
MPS 1.4 - APIC platform          26    26 0x0000000f
MPS 1.4 - APIC platform          27    27 0x0000000f
MPS 1.4 - APIC platform          28    28 0x0000000f
MPS 1.4 - APIC platform          29    29 0x0000000f
MPS 1.4 - APIC platform          30    30 0x0000000f
MPS 1.4 - APIC platform          31    31 0x0000000f
MPS 1.4 - APIC platform          32    32 0x0000000f
MPS 1.4 - APIC platform          33    33 0x0000000f
MPS 1.4 - APIC platform          34    34 0x0000000f
MPS 1.4 - APIC platform          35    35 0x0000000f
MPS 1.4 - APIC platform          36    36 0x0000000f
MPS 1.4 - APIC platform          37    37 0x0000000f
MPS 1.4 - APIC platform          38    38 0x0000000f
MPS 1.4 - APIC platform          39    39 0x0000000f
MPS 1.4 - APIC platform          40    40 0x0000000f
MPS 1.4 - APIC platform          41    41 0x0000000f
MPS 1.4 - APIC platform          42    42 0x0000000f
MPS 1.4 - APIC platform          43    43 0x0000000f
MPS 1.4 - APIC platform          44    44 0x0000000f
MPS 1.4 - APIC platform          45    45 0x0000000f
MPS 1.4 - APIC platform          46    46 0x0000000f
MPS 1.4 - APIC platform          47    47 0x0000000f
MPS 1.4 - APIC platform          61    61 0x0000000f
MPS 1.4 - APIC platform          65    65 0x0000000f
MPS 1.4 - APIC platform          80    80 0x0000000f
MPS 1.4 - APIC platform         193   193 0x0000000f
MPS 1.4 - APIC platform         225   225 0x0000000f
MPS 1.4 - APIC platform         253   253 0x0000000f
MPS 1.4 - APIC platform         254   254 0x0000000f
MPS 1.4 - APIC platform         255   255 0x0000000f
i8042prt                          1     1 0xffffffff
i8042prt                         12    12 0xffffffff
Serial                            4     4 0x00000000
Serial                            3     3 0x00000000
E100B                            20    20 0x00000000
Floppy                            6     6 0x00000000
aic78xx                          40    40 0x00000000
aic78xx                          28    28 0x00000000
aic78xx                          29    29 0x00000000
-------------------------------------------------------------------------
Devices                       Physical Address  Length
-------------------------------------------------------------------------
MPS 1.4 - APIC platform         0x00000000  0x0000000010
MPS 1.4 - APIC platform         0x00000020  0x0000000002
MPS 1.4 - APIC platform         0x00000040  0x0000000004
MPS 1.4 - APIC platform         0x00000048  0x0000000004
MPS 1.4 - APIC platform         0x00000061  0x0000000001
MPS 1.4 - APIC platform         0x00000070  0x0000000002
MPS 1.4 - APIC platform         0x00000080  0x0000000010
MPS 1.4 - APIC platform         0x00000092  0x0000000001
MPS 1.4 - APIC platform         0x000000a0  0x0000000002
MPS 1.4 - APIC platform         0x000000c0  0x0000000010
MPS 1.4 - APIC platform         0x000000f0  0x0000000010
i8042prt                        0x00000060  0x0000000001
i8042prt                        0x00000064  0x0000000001
Serial                          0x000003f8  0x0000000007
Serial                          0x000002f8  0x0000000007
E100B                           0x00003800  0x000000001e
Floppy                          0x000003f0  0x0000000006
Floppy                          0x000003f7  0x0000000001
aic78xx                         0x00002000  0x0000000100
aic78xx                         0x00003000  0x0000000100
aic78xx                         0x00003400  0x0000000100
cirrus                          0x000003b0  0x000000000c
cirrus                          0x000003c0  0x0000000020



DMA and Memory Report
-------------------------------------------------------------------------
Devices                         Channel    Port
-------------------------------------------------------------------------
Floppy                            2     0
-------------------------------------------------------------------------
Devices                         Physical Address  Length
-------------------------------------------------------------------------
MPS 1.4 - APIC platform         0xfec10000  0x00000400
MPS 1.4 - APIC platform         0xfee00000  0x00000400
E100B                           0xfc400000  0x0000001e
aic78xx                         0xfa000000  0x00001000
aic78xx                         0xfc100000  0x00001000
aic78xx                         0xfc101000  0x00001000
cirrus                          0x000a0000  0x00020000
cirrus                          0xfb000000  0x01000000



Environment Report
-------------------------------------------------------------------------



System Environment Variables
   ComSpec=C:\WINNT\system32\cmd.exe
   HOME=C:/
   NTRESKIT=Z:\NTRESKIT
   NUMBER_OF_PROCESSORS=4
   OS=Windows_NT
   Os2LibPath=C:\WINNT\system32\os2\dll;

Path=C:\MKS\mksnt;C:\WINNT\system32;C:\WINNT;Z:\NTRESKIT;Z:\NTRESKIT\Perl;
z:\emon\bin;C:\MSSQL7\BINN
```

```
   PROCESSOR_ARCHITECTURE=x86
   PROCESSOR_IDENTIFIER=x86 Family 6 Model 7 Stepping 2, GenuineIntel
   PROCESSOR_LEVEL=6
   PROCESSOR_REVISION=0702
   ROOTDIR=C:/MKS
   SHELL=C:/MKS/mksnt/sh.exe
   TMPDIR=C:/TEMP
   windir=C:\WINNT



Environment Variables for Current User
   TEMP=C:\TEMP
   TMP=C:\TEMP



Network Report
------------------------------------------------------------------------
Your Access Level: Admin & Local
Workgroup or Domain: WORKGROUP
Network Version: 4.0
LanRoot: WORKGROUP
Logged On Users: 1
Current User (1): Administrator
  Logon Domain: AVALON4
  Logon Server: AVALON4

Transport: Nbf_E100B1, 00-A0-C9-D9-1D-0A, VC's: 0, Wan: Wan

Character Wait: 3,600
Collection Time: 250
Maximum Collection Count: 16
Keep Connection: 600
Maximum Commands: 5
Session Time Out: 45
Character Buffer Size: 512
Maximum Threads: 17
Lock Quota: 6,144
Lock Increment: 10
Maximum Locks: 500
Pipe Increment: 10
Maximum Pipes: 500
Cache Time Out: 40
Dormant File Limit: 45
Read Ahead Throughput: 4,294,967,295
Mailslot Buffers: 3
Server Announce Buffers: 20
Illegal Datagrams: 5
Datagram Reset Frequency: 60
Log Election Packets: False
Use Opportunistic Locking: True
Use Unlock Behind: True
Use Close Behind: True
Buffer Pipes: True
Use Lock, Read, Unlock: True
Use NT Caching: True
Use Raw Read: True
Use Raw Write: True
Use Write Raw Data: True
Use Encryption: True
Buffer Deny Write Files: True
Buffer Read Only Files: True
Force Core Creation: True
512 Byte Max Transfer: False
Bytes Received: 875
SMB's Received: 9
Paged Read Bytes Requested: 0
Non Paged Read Bytes Requested: 0
Cache Read Bytes Requested: 0
Network Read Bytes Requested: 0
Bytes Transmitted: 1,279
SMB's Transmitted: 9
Paged Read Bytes Requested: 0
Non Paged Read Bytes Requested: 0
Cache Read Bytes Requested: 0
Network Read Bytes Requested: 0
Initally Failed Operations: 0
Failed Completion Operations: 0
Read Operations: 0
Random Read Operations: 0
Read SMB's: 0
Large Read SMB's: 0
Small Read SMB's: 0
Write Operations: 0
Random Write Operations: 0
Write SMB's: 0
Large Write SMB's: 0
Small Write SMB's: 0
Raw Reads Denied: 0
Raw Writes Denied: 0
Network Errors: 0
Sessions: 3
Failed Sessions: 0
Reconnects: 0
Core Connects: 0
LM 2.0 Connects: 0
LM 2.x Connects: 0
Windows NT Connects: 2
Server Disconnects: 1
Hung Sessions: 0
Use Count: 2
Failed Use Count: 0
Current Commands: 0
Server File Opens: 0
Server Device Opens: 0
Server Jobs Queued: 0
Server Session Opens: 0
Server Sessions Timed Out: 0
Server Sessions Errored Out: 0
Server Password Errors: 0
Server Permission Errors: 0
Server System Errors: 0
Server Bytes Sent: 269
Server Bytes Received: 485
Server Average Response Time: 0
Server Request Buffers Needed: 0
Server Big Buffers Needed: 0
```

NT Server Registry Information

Software\Microsoft\MSSQLServer

```
       Key Name:          SOFTWARE\Microsoft\MSSQLServer
       Class Name:        <NO CLASS>
       Last Write Time:   11/25/98 - 4:12 PM
       Value 0
         Name:            ConfigurationInformation
         Type:            REG_BINARY
         Data:
       00000000   ff 9c 5c 36 07 00 00 00 - 41 00 56 00 41 00 4c 00
..\6....
       A.V.A.L.
       00000010   4f 00 4e 00 34 00 00 00 - 00 00 00 00 00 00 00 00
O.N.4...
       ........
       00000020   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000030   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000040   00 00 00 00 00 00 00 00 - 53 00 41 00 4d 00 26 00
........
       S.A.M.&.
       00000050   4d 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
M.......
       ........
       00000060   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000070   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000080   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000090   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       000000a0   00 00 00 00 00 00 00 00 - 00 00 00 00 07 00 00 00
........
       ........
       000000b0   00 00 00 00 6a 02 00 00 - 03 00 00 00 01 00 00 00
....j...
       ........
       000000c0   32 00 00 00 00 82 00 00 - 04 00 00 00 04 00 00 00
2.......
       ........
       000000d0   00 00 00 00 65 05 00 00 - 04 00 00 00 04 00 00 00
....e...
       ........
       000000e0   5f 0e 00 00 aa 0d 00 00 - 11 00 00 00
_.......
       ....
```

```
Key Name:          SOFTWARE\Microsoft\MSSQLServer\Client
Class Name:        <NO CLASS>
Last Write Time:   9/2/98 - 2:13 PM

Key Name:          SOFTWARE\Microsoft\MSSQLServer\Client\ConnectTo
Class Name:        <NO CLASS>
Last Write Time:   2/2/99 - 2:54 PM
Value 0
  Name:            DSQUERY
  Type:            REG_SZ
  Data:            DBMSSOCN


Key Name:          SOFTWARE\Microsoft\MSSQLServer\Client\DB-Lib
Class Name:        <NO CLASS>
Last Write Time:   2/2/99 - 2:54 PM
Value 0
  Name:            AutoAnsiToOem
  Type:            REG_SZ
  Data:            ON

Value 1
  Name:            UseIntlSettings
  Type:            REG_SZ
  Data:            ON


Key Name:          SOFTWARE\Microsoft\MSSQLServer\Client\TDS
Class Name:        <NO CLASS>
Last Write Time:   11/17/98 - 11:53 AM
Value 0
  Name:            <NO NAME>
  Type:            REG_SZ
  Data:            7.0

Value 1
  Name:            .
  Type:            REG_SZ
  Data:            7.0

Value 2
  Name:            Avalon4
  Type:            REG_SZ
  Data:            7.0

Value 3
  Name:            TheLocalServerUsingPipes
  Type:            REG_SZ
  Data:            7.0


Key Name:          SOFTWARE\Microsoft\MSSQLServer\MSSQLServer
Class Name:        <NO CLASS>
Last Write Time:   1/11/99 - 11:35 AM
Value 0
  Name:            AuditLevel
  Type:            REG_DWORD
```

```
  Data:             0

Value 1
  Name:             BackupDirectory
  Type:             REG_SZ
  Data:             C:\MSSQL7\BACKUP

Value 2
  Name:             DefaultCompStyle
  Type:             REG_SZ
  Data:             0

Value 3
  Name:             DefaultDomain
  Type:             REG_SZ
  Data:             AVALON4

Value 4
  Name:             DefaultLocaleID
  Type:             REG_SZ
  Data:             8200

Value 5
  Name:             DefaultLogin
  Type:             REG_SZ
  Data:             guest

Value 6
  Name:             DefaultSortID
  Type:             REG_SZ
  Data:             50

Value 7
  Name:             ListenOn
  Type:             REG_MULTI_SZ
  Data:             SSNMPN70,\\.\pipe\sql\query
                    SSMSSO70,1433



Value 8
  Name:             LoginMode
  Type:             REG_DWORD
  Data:             0

Value 9
  Name:             Map#
  Type:             REG_SZ
  Data:             -

Value 10
  Name:             Map$
  Type:             REG_SZ
  Data:

Value 11
  Name:             Map_
  Type:             REG_SZ
  Data:             \

Value 12
  Name:             ResourceMgrID
  Type:             REG_SZ
  Data:             {E5ADE8B6-A98B-11D2-BA85-00A0C9C545C4}

Value 13
  Name:             RWSListenAddress
  Type:             REG_SZ
  Data:

Value 14
  Name:             SetHostName
  Type:             REG_DWORD
  Data:             0

Value 15
  Name:             Tapeloadwaittime
  Type:             REG_DWORD
  Data:             0xffffffff


Key Name:
SOFTWARE\Microsoft\MSSQLServer\MSSQLServer\CurrentV
                    ersion
Class Name:         <NO CLASS>
Last Write Time:    1/11/99 - 11:28 AM
Value 0
  Name:             checksum
  Type:             REG_BINARY
  Data:
00000000   37 36 32 32 63 31 35 38 - 61 65 37 64 34 63 64 37
7622c158
ae7d4cd7
00000010   35 30 64 61 30 33 34 62 - 36 30 31 35 62 66 66 33
50da034b
6015bff3
00000020   66 38 34 66 64 34 62 66 - 35 65 33 64 36 66 63 36
f84fd4bf
5e3d6fc6
00000030   34 31 33 32 33 39 30 33 - 65 39 39 61 65 64 30 61
41323903
e99aed0a
00000040   62 35 33 33 30 65 34 37 - 37 61 65 62 39 65 61 62
b5330e47
7aeb9eab
00000050   66 65 62 65 30 30 31 30 - 66 61 33 66 65 32 62 62
febe0010
fa3fe2bb
00000060   62 61 32 62 65 63 63 65 - 37 61 64 30 61 64 30 65
ba2becce
7ad0ad0e
00000070   36 34 36 32 39 38 38 31 - 61 63 66 34 63 33 35 30
64629881
acf4c350
00000080   65 30 39 36 36 38 62 66 - 33 38 33 62 39 64 32 61
e09668bf
383b9d2a
00000090   33 31 63 30 33 62 31 64 - 39 39 00
31c03b1d
```

```
99.

Value 1
  Name:             CurrentVersion
  Type:             REG_SZ
  Data:             7.00.623

Value 2
  Name:             RegisteredOwner
  Type:             REG_SZ
  Data:             SAM&M

Value 3
  Name:             SerialNumber
  Type:             REG_DWORD
  Data:             0x81530040


Key Name:
SOFTWARE\Microsoft\MSSQLServer\MSSQLServer\Paramete
                    rs
Class Name:         <NO CLASS>
Last Write Time:    1/11/99 - 11:28 AM
Value 0
  Name:             SQLArg0
  Type:             REG_SZ
  Data:             -dC:\MSSQL7\data\master.mdf

Value 1
  Name:             SQLArg1
  Type:             REG_SZ
  Data:             -eC:\MSSQL7\log\ERRORLOG

Value 2
  Name:             SQLArg2
  Type:             REG_SZ
  Data:             -lC:\MSSQL7\data\mastlog.ldf


Key Name:
SOFTWARE\Microsoft\MSSQLServer\MSSQLServer\RPCNetLi
                    b
Class Name:         <NO CLASS>
Last Write Time:    1/11/99 - 11:28 AM
Value 0
  Name:             Security
  Type:             REG_SZ
  Data:


Key Name:           SOFTWARE\Microsoft\MSSQLServer\Providers
Class Name:         <NO CLASS>
Last Write Time:    1/11/99 - 11:31 AM
Value 0
  Name:             AllowInProcess
  Type:             REG_DWORD
  Data:             0x1


Key Name:
SOFTWARE\Microsoft\MSSQLServer\Providers\ADSDSOObje
                    ct
Class Name:         <NO CLASS>
Last Write Time:    1/11/99 - 11:31 AM
Value 0
  Name:             AllowInProcess
  Type:             REG_DWORD
  Data:             0x1


Key Name:
SOFTWARE\Microsoft\MSSQLServer\Providers\DTSPackage
                    DSO
Class Name:         <NO CLASS>
Last Write Time:    1/11/99 - 11:31 AM
Value 0
  Name:             AllowInProcess
  Type:             REG_DWORD
  Data:             0x1


Key Name:
SOFTWARE\Microsoft\MSSQLServer\Providers\Microsoft.
                    Jet.OLEDB.4.0
Class Name:         <NO CLASS>
Last Write Time:    1/11/99 - 11:31 AM
Value 0
  Name:             AllowInProcess
  Type:             REG_DWORD
  Data:             0x1


Key Name:           SOFTWARE\Microsoft\MSSQLServer\Providers\MSDAORA
Class Name:         <NO CLASS>
Last Write Time:    1/11/99 - 11:31 AM
Value 0
  Name:             AllowInProcess
  Type:             REG_DWORD
  Data:             0x1


Key Name:           SOFTWARE\Microsoft\MSSQLServer\Providers\MSDASQL
Class Name:         <NO CLASS>
Last Write Time:    1/11/99 - 11:31 AM
Value 0
  Name:             AllowInProcess
  Type:             REG_DWORD
  Data:             0x1


Key Name:           SOFTWARE\Microsoft\MSSQLServer\Providers\MSIDXS
Class Name:         <NO CLASS>
Last Write Time:    1/11/99 - 11:31 AM
Value 0
  Name:             AllowInProcess
  Type:             REG_DWORD
  Data:             0x1
```

```
       Key Name:
SOFTWARE\Microsoft\MSSQLServer\Providers\MSQLImpPro
                        v
       Class Name:         <NO CLASS>
       Last Write Time:    1/11/99 - 11:31 AM
       Value 0
         Name:             AllowInProcess
         Type:             REG_DWORD
         Data:             0x1


       Key Name:
SOFTWARE\Microsoft\MSSQLServer\Providers\MSSEARCHSQ
                        L
       Class Name:         <NO CLASS>
       Last Write Time:    1/11/99 - 11:31 AM
       Value 0
         Name:             AllowInProcess
         Type:             REG_DWORD
         Data:             0x1


       Key Name:
SOFTWARE\Microsoft\MSSQLServer\Providers\SQLOLEDB
       Class Name:         <NO CLASS>
       Last Write Time:    1/11/99 - 11:31 AM
       Value 0
         Name:             AllowInProcess
         Type:             REG_DWORD
         Data:             0x1


       Key Name:           SOFTWARE\Microsoft\MSSQLServer\Replication
       Class Name:         <NO CLASS>
       Last Write Time:    6/10/98 - 12:00 PM

       Key Name:
SOFTWARE\Microsoft\MSSQLServer\Replication\MergeRep
                        licationProvider
       Class Name:         <NO CLASS>
       Last Write Time:    6/10/98 - 12:00 PM

       Key Name:
SOFTWARE\Microsoft\MSSQLServer\Replication\MergeRep
                        licationProvider\7.0
       Class Name:         <NO CLASS>
       Last Write Time:    6/10/98 - 12:00 PM

       Key Name:
SOFTWARE\Microsoft\MSSQLServer\Replication\MergeRep
                        licationProvider\7.0\MsJet
       Class Name:         <NO CLASS>
       Last Write Time:    1/11/99 - 11:31 AM
       Value 0
         Name:             <NO NAME>
         Type:             REG_SZ
         Data:             {f159cf30-0db4-11d1-b272-00aa00b8de95}


       Key Name:           SOFTWARE\Microsoft\MSSQLServer\Setup
       Class Name:         <NO CLASS>
       Last Write Time:    1/11/99 - 11:28 AM
       Value 0
         Name:             SourcePath
         Type:             REG_SZ
         Data:             Z:\Sql70623

       Value 1
         Name:             SQLDataRoot
         Type:             REG_SZ
         Data:             C:\MSSQL7

       Value 2
         Name:             SQLPath
         Type:             REG_SZ
         Data:             C:\MSSQL7


       Key Name:           SOFTWARE\Microsoft\MSSQLServer\SNMP
       Class Name:         <NO CLASS>
       Last Write Time:    11/13/98 - 9:27 AM

       Key Name:
SOFTWARE\Microsoft\MSSQLServer\SNMP\CurrentVersion
       Class Name:         <NO CLASS>
       Last Write Time:    1/11/99 - 11:31 AM
       Value 0
         Name:             Pathname
         Type:             REG_EXPAND_SZ
         Data:             C:\MSSQL7\BINN\sqlsnmp.dll


       Key Name:           SOFTWARE\Microsoft\MSSQLServer\SQL Service
Manager
       Class Name:         <NO CLASS>
       Last Write Time:    1/11/99 - 11:31 AM
       Value 0
         Name:             Action Verify
         Type:             REG_DWORD
         Data:             0

       Value 1
         Name:             DefaultSvc
         Type:             REG_SZ
         Data:             MSSQLServer

       Value 2
         Name:             Remote
         Type:             REG_DWORD
         Data:             0x1

       Value 3
         Name:             Services
         Type:             REG_MULTI_SZ
         Data:             MSSQLServer
                           SQLServerAgent
                           MSDTC
```

```
Key Name:           SOFTWARE\Microsoft\MSSQLServer\SQLEW
Class Name:         <NO CLASS>
Last Write Time:    1/11/99 - 11:31 AM

Key Name:           SOFTWARE\Microsoft\MSSQLServer\SQLEW\Replication
Class Name:         <NO CLASS>
Last Write Time:    1/11/99 - 11:31 AM
Value 0
  Name:             PerfmonFile
  Type:             REG_SZ
  Data:             C:\MSSQL7\BINN\REPLMON.PMC


Key Name:           SOFTWARE\Microsoft\MSSQLServer\SQLEW\Wizards
Class Name:         <NO CLASS>
Last Write Time:    1/11/99 - 11:31 AM
Value 0
  Name:             Web Assistant
  Type:             REG_SZ
  Data:             C:\MSSQL7\BINN\semwebwz.DLL^WebWizardEntry


Key Name:           SOFTWARE\Microsoft\MSSQLServer\SQLServerAgent
Class Name:         <NO CLASS>
Last Write Time:    1/11/99 - 11:31 AM
Value 0
  Name:             DownloadedMaxRows
  Type:             REG_DWORD
  Data:             0x64

Value 1
  Name:             ErrorLogFile
  Type:             REG_SZ
  Data:             C:\MSSQL7\LOG\SQLAGENT.OUT

Value 2
  Name:             ErrorLoggingLevel
  Type:             REG_DWORD
  Data:             0x3

Value 3
  Name:             JobHistoryMaxRows
  Type:             REG_DWORD
  Data:             0x3e8

Value 4
  Name:             JobHistoryMaxRowsPerJob
  Type:             REG_DWORD
  Data:             0x64

Value 5
  Name:             MSXServerName
  Type:             REG_SZ
  Data:

Value 6
  Name:             NonAlertableErrors
  Type:             REG_SZ
  Data:             1204,4002

Value 7
  Name:             RestartSQLServer
  Type:             REG_DWORD
  Data:             0x1

Value 8
  Name:             ServerHost
  Type:             REG_SZ
  Data:

Value 9
  Name:             WorkingDirectory
  Type:             REG_SZ
  Data:             C:\MSSQL7\JOBS


Key Name:
SOFTWARE\Microsoft\MSSQLServer\SQLServerAgent\Subsy
                    stems
Class Name:         <NO CLASS>
Last Write Time:    1/11/99 - 11:31 AM
Value 0
  Name:             ActiveScripting
  Type:             REG_SZ
  Data:
```

Software\Intel\E100B

```
Key Name:           SOFTWARE\Intel\E100B
Class Name:         <NO CLASS>
Last Write Time:    2/12/99 - 2:14 PM

Key Name:           SOFTWARE\Intel\E100B\CurrentVersion
Class Name:         <NO CLASS>
Last Write Time:    2/12/99 - 2:14 PM
Value 0
  Name:             Description
  Type:             REG_SZ
  Data:             Intel(R) PRO NDIS Driver

Value 1
  Name:             InstallDate
  Type:             REG_DWORD
  Data:             0x36c4a7b4

Value 2
  Name:             MajorVersion
  Type:             REG_DWORD
  Data:             0x30002

Value 3
  Name:             MinorVersion
```

```
  Type:            REG_DWORD
  Data:            0

Value 4
  Name:            OperationsSupport
  Type:            REG_DWORD
  Data:            0xff

Value 5
  Name:            RefCount
  Type:            REG_DWORD
  Data:            0x1

Value 6
  Name:            Review
  Type:            REG_DWORD
  Data:            0

Value 7
  Name:            ServiceName
  Type:            REG_SZ
  Data:            E100B

Value 8
  Name:            SoftwareType
  Type:            REG_SZ
  Data:            driver

Value 9
  Name:            Title
  Type:            REG_SZ
  Data:            Intel(R) PRO NDIS Driver


Key Name:          SOFTWARE\Intel\E100B\CurrentVersion\NetRules
Class Name:        <NO CLASS>
Last Write Time:   2/12/99 - 2:14 PM
Value 0
  Name:            bindable
  Type:            REG_MULTI_SZ
  Data:            E100BDriver E100BAdapter non exclusive 100


Value 1
  Name:            bindform
  Type:            REG_SZ
  Data:            "E100BSys" yes no container

Value 2
  Name:            class
  Type:            REG_MULTI_SZ
  Data:            E100BDriver basic


Value 3
  Name:            InfName
  Type:            REG_SZ
  Data:            oemnad18.inf

Value 4
  Name:            InfOption
  Type:            REG_SZ
  Data:            E100B

Value 5
  Name:            type
  Type:            REG_SZ
  Data:            E100BSys ndisDriver E100BDriver

Value 6
  Name:            use
  Type:            REG_SZ
  Data:            driver


Key Name:          SOFTWARE\Intel\Intel 3D Scalability Toolkit
Class Name:        <NO CLASS>
Last Write Time:   6/10/98 - 11:38 AM
Value 0
  Name:            Proctex Debug Level
  Type:            REG_DWORD
  Data:            0


Key Name:          SOFTWARE\Intel\PROSet
Class Name:        <NO CLASS>
Last Write Time:   2/12/99 - 2:14 PM
Value 0
  Name:            InfName
  Type:            REG_SZ
  Data:            oemnad18.inf

Value 1
  Name:            MaxVLANs
  Type:            REG_DWORD
  Data:            0x37

Value 2
  Name:            TrayIcon
  Type:            REG_DWORD
  Data:            0
```

Services/Disk

```
Key Name:          SYSTEM\CurrentControlSet\Services\Disk
Class Name:        <NO CLASS>
Last Write Time:   10/10/96 - 1:09 AM
Value 0
  Name:            DependOnGroup
  Type:            REG_MULTI_SZ
  Data:            SCSI miniport


Value 1
  Name:            ErrorControl
  Type:            REG_DWORD
```

```
  Data:            0

Value 2
  Name:            Group
  Type:            REG_SZ
  Data:            SCSI Class

Value 3
  Name:            Start
  Type:            REG_DWORD
  Data:            0

Value 4
  Name:            Tag
  Type:            REG_DWORD
  Data:            0x2

Value 5
  Name:            Type
  Type:            REG_DWORD
  Data:            0x1


Key Name:          SYSTEM\CurrentControlSet\Services\Disk\Enum
Class Name:        <NO CLASS>
Last Write Time:   6/17/98 - 6:46 PM
Value 0
  Name:            0
  Type:            REG_SZ
  Data:            Root\LEGACY_DISK\0000

Value 1
  Name:            Count
  Type:            REG_DWORD
  Data:            0x1

Value 2
  Name:            NextInstance
  Type:            REG_DWORD
  Data:            0x1
```

Services\E100B

```
Key Name:          SYSTEM\CurrentControlSet\Services\E100B
Class Name:        <NO CLASS>
Last Write Time:   3/1/99 - 11:13 AM
Value 0
  Name:            DisplayName
  Type:            REG_SZ
  Data:            Intel(R) PRO NDIS Driver

Value 1
  Name:            ErrorControl
  Type:            REG_DWORD
  Data:            0x1

Value 2
  Name:            Group
  Type:            REG_SZ
  Data:            NDIS

Value 3
  Name:            ImagePath
  Type:            REG_EXPAND_SZ
  Data:            \SystemRoot\System32\drivers\E100BNT.SYS

Value 4
  Name:            RequestedSystemResources
  Type:            REG_RESOURCE_REQUIREMENTS_LIST
  Data:
                   Interface Type:      Internal
                   Bus Number:          0
                   Slot Number:         0
                   List 0
                     Descriptor 0
                       Resource:        Interrupt
                       Option:          0x00000000
                       Disposition:     Shared
                       Type:            Level Sensitive
                       Minimum Vector:  0x14
                       Maximum Vector:  0x14

                     Descriptor 1
                       Resource:        Memory
                       Option:          0x00000001
                       Disposition:     Device Exclusive
                       Type:            Write Only
                       Length:          0x1000
                       Alignment:       0x1000
                       Minimum Address: 0xfc400000
                       Maximum Address: 0xfc400fff

                     Descriptor 2
                       Resource:        Memory
                       Option:          0x00000009
                       Disposition:     Device Exclusive
                       Type:            Write Only
                       Length:          0x1000
                       Alignment:       0x1000
                       Minimum Address: 0xfc400000
                       Maximum Address: 0xfc400fff

                     Descriptor 3
                       Resource:        Memory
                       Option:          0x00000008
                       Disposition:     Device Exclusive
                       Type:            Write Only
                       Length:          0x1000
                       Alignment:       0x1000
                       Minimum Address: 0xfc000000
                       Maximum Address: 0xfc0fffff

                     Descriptor 4
                       Resource:        Port
                       Option:          0x00000001
                       Disposition:     Device Exclusive
```

```
                    Type:            Port
                    Length:          0x20
                    Alignment:       0x20
                    Minimum Address: 0x00003800
                    Maximum Address: 0x0000381f

                  Descriptor 5
                    Resource:        Port
                    Option:          0x00000008
                    Disposition:     Device Exclusive
                    Type:            Port
                    Length:          0x20
                    Alignment:       0x20
                    Minimum Address: 0x00003800
                    Maximum Address: 0x0000381f

                  Descriptor 6
                    Resource:        Memory
                    Option:          0x00000001
                    Disposition:     Device Exclusive
                    Type:            Read / Write
                    Length:          0x100000
                    Alignment:       0x100000
                    Minimum Address: 0xfc000000
                    Maximum Address: 0xfc0fffff

                  Descriptor 7
                    Resource:        Memory
                    Option:          0x00000008
                    Disposition:     Device Exclusive
                    Type:            Read / Write
                    Length:          0x100000
                    Alignment:       0x100000
                    Minimum Address: 0xfc000000
                    Maximum Address: 0xfc0fffff

Value 5
  Name:            Start
  Type:            REG_DWORD
  Data:            0x2

Value 6
  Name:            Type
  Type:            REG_DWORD
  Data:            0x1


Key Name:          SYSTEM\CurrentControlSet\Services\E100B\Enum
Class Name:        <NO CLASS>
Last Write Time:   3/1/99 - 11:12 AM
Value 0
  Name:            0
  Type:            REG_SZ
  Data:            Root\LEGACY_E100B\0000

Value 1
  Name:            Count
  Type:            REG_DWORD
  Data:            0x1

Value 2
  Name:            NextInstance
  Type:            REG_DWORD
  Data:            0x1


Key Name:          SYSTEM\CurrentControlSet\Services\E100B\Linkage
Class Name:        <NO CLASS>
Last Write Time:   2/12/99 - 2:21 PM
Value 0
  Name:            Bind
  Type:            REG_MULTI_SZ
  Data:            \Device\E100B1


Value 1
  Name:            Export
  Type:            REG_MULTI_SZ
  Data:            \Device\E100B1


Value 2
  Name:            Route
  Type:            REG_MULTI_SZ
  Data:            "E100B1"


Key Name:
SYSTEM\CurrentControlSet\Services\E100B\Linkage\Dis
                   abled
Class Name:        <NO CLASS>
Last Write Time:   2/12/99 - 2:21 PM
Value 0
  Name:            Bind
  Type:            REG_MULTI_SZ
  Data:

Value 1
  Name:            Export
  Type:            REG_MULTI_SZ
  Data:

Value 2
  Name:            Route
  Type:            REG_MULTI_SZ
  Data:


Key Name:
SYSTEM\CurrentControlSet\Services\E100B\Parameters
Class Name:        <NO CLASS>
Last Write Time:   2/12/99 - 2:14 PM

Key Name:          SYSTEM\CurrentControlSet\Services\E100B\Security
Class Name:        <NO CLASS>
Last Write Time:   2/12/99 - 2:14 PM
Value 0
  Name:            Security
```

```
        Type:            REG_BINARY
        Data:
      00000000   01 00 14 80 c0 00 00 00 - cc 00 00 00 14 00 00 00
........
      ........
      00000010   34 00 00 00 02 00 20 00 - 01 00 00 00 02 80 18 00
4..... .
      ........
      00000020   ff 01 0f 00 01 01 00 00 - 00 00 00 01 00 00 00 00
........
      ........
      00000030   20 02 00 00 02 00 8c 00 - 05 00 00 00 00 00 18 00
.......
      ........
      00000040   8d 01 02 00 01 01 00 00 - 00 00 00 01 00 00 00 00
........
      ........
      00000050   4f 00 4b 00 00 00 1c 00 - fd 01 02 00 01 02 00 00
O.K.....
      ........
      00000060   00 00 00 05 20 00 00 00 - 23 02 00 00 44 00 44 00  ....
...
      #...D.D.
      00000070   00 00 1c 00 ff 01 0f 00 - 01 02 00 00 00 00 00 05
........
      ........
      00000080   20 00 00 00 20 02 00 00 - 44 00 44 00 00 00 1c 00   ...
...
      D.D.....
      00000090   ff 01 0f 00 01 02 00 00 - 00 00 00 05 20 00 00 00
........
      .... ...
      000000a0   25 02 00 00 44 00 44 00 - 00 00 18 00 fd 01 02 00
%...D.D.
      ........
      000000b0   01 01 00 00 00 00 00 05 - 12 00 00 00 25 02 00 00
........
      ....%...
      000000c0   01 01 00 00 00 00 00 05 - 12 00 00 00 01 01 00 00
........
      ........
      000000d0   00 00 00 05 12 00 00 00 -
........
```

Services\E100B1

```
      Key Name:          SYSTEM\CurrentControlSet\Services\E100B1
      Class Name:        <NO CLASS>
      Last Write Time:   2/12/99 - 2:14 PM
      Value 0
        Name:            ErrorControl
        Type:            REG_DWORD
        Data:            0x1

      Value 1
        Name:            Start
        Type:            REG_DWORD
        Data:            0x3

      Value 2
        Name:            type
        Type:            REG_DWORD
        Data:            0x4


      Key Name:          SYSTEM\CurrentControlSet\Services\E100B1\Linkage
      Class Name:        <NO CLASS>
      Last Write Time:   3/1/99 - 11:13 AM
      Value 0
        Name:            Bind
        Type:            REG_MULTI_SZ
        Data:            \Device\E100B1


      Value 1
        Name:            Export
        Type:            REG_MULTI_SZ
        Data:            \Device\E100B1


      Value 2
        Name:            Route
        Type:            REG_MULTI_SZ
        Data:            "E100B1"



      Key Name:
SYSTEM\CurrentControlSet\Services\E100B1\Linkage\Di
                         sabled
      Class Name:        <NO CLASS>
      Last Write Time:   2/12/99 - 2:14 PM

      Key Name:
SYSTEM\CurrentControlSet\Services\E100B1\Parameters
      Class Name:        <NO CLASS>
      Last Write Time:   2/25/99 - 3:53 PM
      Value 0
        Name:            Adaptive_IFS
        Type:            REG_DWORD
        Data:            0x2

      Value 1
        Name:            BoardHasBridge
        Type:            REG_DWORD
        Data:            0

      Value 2
        Name:            BusNumber
        Type:            REG_DWORD
        Data:            0x3

      Value 3
        Name:            BusType
        Type:            REG_DWORD
        Data:            0x5
```

```
Value 4
  Name:             BusTypeLocal
  Type:             REG_DWORD
  Data:             0x5

Value 5
  Name:             Coalesce
  Type:             REG_DWORD
  Data:             0x1

Value 6
  Name:             CPUSaver
  Type:             REG_DWORD
  Data:             0xa00

Value 7
  Name:             ForceDpx
  Type:             REG_DWORD
  Data:             0

Value 8
  Name:             Location
  Type:             REG_SZ
  Data:             289000

Value 9
  Name:             MediaType
  Type:             REG_DWORD
  Data:             0x1

Value 10
  Name:             MWIEnable
  Type:             REG_DWORD
  Data:             0

Value 11
  Name:             NetworkAddress
  Type:             REG_SZ
  Data:

Value 12
  Name:             NumCoalesce
  Type:             REG_DWORD
  Data:             0x20

Value 13
  Name:             NumRfd
  Type:             REG_DWORD
  Data:             0x60

Value 14
  Name:             NumTbdPerTcb
  Type:             REG_DWORD
  Data:             0xc

Value 15
  Name:             NumTcb
  Type:             REG_DWORD
  Data:             0x40

Value 16
  Name:             PacketTagging
  Type:             REG_DWORD
  Data:             0

Value 17
  Name:             PcNic
  Type:             REG_DWORD
  Data:             0x1

Value 18
  Name:             RxDmaCount
  Type:             REG_DWORD
  Data:             0

Value 19
  Name:             RxFifo
  Type:             REG_DWORD
  Data:             0x8

Value 20
  Name:             SlotNumber
  Type:             REG_DWORD
  Data:             0x5

Value 21
  Name:             Speed
  Type:             REG_DWORD
  Data:             0

Value 22
  Name:             Threshold
  Type:             REG_DWORD
  Data:             0x20

Value 23
  Name:             TxDmaCount
  Type:             REG_DWORD
  Data:             0

Value 24
  Name:             TxFifo
  Type:             REG_DWORD
  Data:             0x8

Value 25
  Name:             Txmitwait
  Type:             REG_DWORD
  Data:             0x1

Value 26
  Name:             UcodeSW
  Type:             REG_DWORD
  Data:             0x1

Value 27
  Name:             UnderrunRetry
```

```
        Type:           REG_DWORD
        Data:           0x1

      Value 28
        Name:           UseIo
        Type:           REG_DWORD
        Data:           0x2

      Value 29
        Name:           UseManualPCIAssign
        Type:           REG_DWORD
        Data:           0

      Value 30
        Name:           VLanMode
        Type:           REG_DWORD
        Data:           0


      Key Name:
SYSTEM\CurrentControlSet\Services\E100B1\Parameters
                        \Tcpip
      Class Name:       GenericClass
      Last Write Time:  3/1/99 - 11:13 AM
      Value 0
        Name:           DefaultGateway
        Type:           REG_MULTI_SZ
        Data:


      Value 1
        Name:           EnableDHCP
        Type:           REG_DWORD
        Data:           0

      Value 2
        Name:           IPAddress
        Type:           REG_MULTI_SZ
        Data:           192.168.91.214


      Value 3
        Name:           IPInterfaceContext
        Type:           REG_DWORD
        Data:           0x1

      Value 4
        Name:           IPInterfaceContextMax
        Type:           REG_DWORD
        Data:           0x1

      Value 5
        Name:           LLInterface
        Type:           REG_SZ
        Data:

      Value 6
        Name:           PPTPFiltering
        Type:           REG_DWORD
        Data:           0

      Value 7
        Name:           RawIPAllowedProtocols
        Type:           REG_MULTI_SZ
        Data:           0


      Value 8
        Name:           SubnetMask
        Type:           REG_MULTI_SZ
        Data:           255.255.255.0


      Value 9
        Name:           TCPAllowedPorts
        Type:           REG_MULTI_SZ
        Data:           0


      Value 10
        Name:           UDPAllowedPorts
        Type:           REG_MULTI_SZ
        Data:           0


      Value 11
        Name:           UseZeroBroadcast
        Type:           REG_DWORD
        Data:           0


      Key Name:
SYSTEM\CurrentControlSet\Services\E100B1\ProsetNdi
      Class Name:       <NO CLASS>
      Last Write Time:  2/12/99 - 2:14 PM

      Key Name:
SYSTEM\CurrentControlSet\Services\E100B1\ProsetNdi\
                        Params
      Class Name:       <NO CLASS>
      Last Write Time:  2/12/99 - 2:14 PM

      Key Name:
SYSTEM\CurrentControlSet\Services\E100B1\ProsetNdi\
                        Params\Adaptive_IFS
      Class Name:       <NO CLASS>
      Last Write Time:  2/12/99 - 2:14 PM
      Value 0
        Name:           Base
        Type:           REG_SZ
        Data:           10

      Value 1
        Name:           Default
        Type:           REG_SZ
        Data:           1

      Value 2
```

```
        Name:            Max
        Type:            REG_SZ
        Data:            255

      Value 3
        Name:            Min
        Type:            REG_SZ
        Data:            0

      Value 4
        Name:            MiniHelp
        Type:            REG_SZ
        Data:

      Value 5
        Name:            ParamDesc
        Type:            REG_SZ
        Data:            Adaptive Inter-Frame Spacing

      Value 6
        Name:            Scale
        Type:            REG_SZ
        Data:            1

      Value 7
        Name:            Step
        Type:            REG_SZ
        Data:            1

      Value 8
        Name:            Type
        Type:            REG_SZ
        Data:            int


      Key Name:
SYSTEM\CurrentControlSet\Services\E100B1\ProsetNdi\
                         Params\Coalesce
      Class Name:        <NO CLASS>
      Last Write Time:   2/12/99 - 2:14 PM
      Value 0
        Name:            Default
        Type:            REG_SZ
        Data:            0

      Value 1
        Name:            MiniHelp
        Type:            REG_SZ
        Data:

      Value 2
        Name:            ParamDesc
        Type:            REG_SZ
        Data:            PCI Bus Efficiency

      Value 3
        Name:            Type
        Type:            REG_SZ
        Data:            enum


      Key Name:
SYSTEM\CurrentControlSet\Services\E100B1\ProsetNdi\
                         Params\Coalesce\Enum
      Class Name:        <NO CLASS>
      Last Write Time:   2/12/99 - 2:14 PM
      Value 0
        Name:            0
        Type:            REG_SZ
        Data:            Disabled

      Value 1
        Name:            1
        Type:            REG_SZ
        Data:            Enabled


      Key Name:
SYSTEM\CurrentControlSet\Services\E100B1\ProsetNdi\
                         Params\CPUSaver
      Class Name:        <NO CLASS>
      Last Write Time:   2/12/99 - 2:14 PM
      Value 0
        Name:            Default
        Type:            REG_SZ
        Data:            1536

      Value 1
        Name:            LeftLabel
        Type:            REG_SZ
        Data:            Adapter Bandwidth

      Value 2
        Name:            MiniHelp
        Type:            REG_SZ
        Data:            Sets optimal point of CPU/Adapter performance
for t
                         his system.  See help.

      Value 3
        Name:            ParamDesc
        Type:            REG_SZ
        Data:            Adaptive Performance Tuning

      Value 4
        Name:            RightLabel
        Type:            REG_SZ
        Data:            CPU Utilization

      Value 5
        Name:            Type
        Type:            REG_SZ
        Data:            slider


      Key Name:
SYSTEM\CurrentControlSet\Services\E100B1\ProsetNdi\
                         Params\CPUSaver\Values
```

```
Class Name:         <NO CLASS>
Last Write Time:    2/12/99 - 2:14 PM
Value 0
  Name:             0
  Type:             REG_SZ
  Data:             0

Value 1
  Name:             1
  Type:             REG_SZ
  Data:             256

Value 2
  Name:             10
  Type:             REG_SZ
  Data:             2560

Value 3
  Name:             11
  Type:             REG_SZ
  Data:             2816

Value 4
  Name:             12
  Type:             REG_SZ
  Data:             3072

Value 5
  Name:             13
  Type:             REG_SZ
  Data:             3328

Value 6
  Name:             14
  Type:             REG_SZ
  Data:             3584

Value 7
  Name:             15
  Type:             REG_SZ
  Data:             3840

Value 8
  Name:             16
  Type:             REG_SZ
  Data:             4096

Value 9
  Name:             2
  Type:             REG_SZ
  Data:             512

Value 10
  Name:             3
  Type:             REG_SZ
  Data:             768

Value 11
  Name:             4
  Type:             REG_SZ
  Data:             1024

Value 12
  Name:             5
  Type:             REG_SZ
  Data:             1280

Value 13
  Name:             6
  Type:             REG_SZ
  Data:             1536

Value 14
  Name:             7
  Type:             REG_SZ
  Data:             1792

Value 15
  Name:             8
  Type:             REG_SZ
  Data:             2048

Value 16
  Name:             9
  Type:             REG_SZ
  Data:             2304


Key Name:
SYSTEM\CurrentControlSet\Services\E100B1\ProsetNdi\
                    Params\ForceDpx
Class Name:         <NO CLASS>
Last Write Time:    2/12/99 - 2:14 PM
Value 0
  Name:             Default
  Type:             REG_SZ
  Data:             0

Value 1
  Name:             MiniHelp
  Type:             REG_SZ
  Data:

Value 2
  Name:             ParamDesc
  Type:             REG_SZ
  Data:             Duplex

Value 3
  Name:             Type
  Type:             REG_SZ
  Data:             enum


Key Name:
SYSTEM\CurrentControlSet\Services\E100B1\ProsetNdi\
                    Params\ForceDpx\Enum
Class Name:         <NO CLASS>
```

```
       Last Write Time:   2/12/99 - 2:14 PM
       Value 0
         Name:            0
         Type:            REG_SZ
         Data:            Auto Detect

       Value 1
         Name:            1
         Type:            REG_SZ
         Data:            Half-Duplex

       Value 2
         Name:            2
         Type:            REG_SZ
         Data:            Full-Duplex


       Key Name:
SYSTEM\CurrentControlSet\Services\E100B1\ProsetNdi\
                        Params\NetworkAddress
       Class Name:        <NO CLASS>
       Last Write Time:   2/12/99 - 2:14 PM
       Value 0
         Name:            Default
         Type:            REG_SZ
         Data:

       Value 1
         Name:            MiniHelp
         Type:            REG_SZ
         Data:

       Value 2
         Name:            ParamDesc
         Type:            REG_SZ
         Data:            Locally Administered Address

       Value 3
         Name:            Type
         Type:            REG_SZ
         Data:            edit


       Key Name:
SYSTEM\CurrentControlSet\Services\E100B1\ProsetNdi\
                        Params\NumCoalesce
       Class Name:        <NO CLASS>
       Last Write Time:   2/12/99 - 2:14 PM
       Value 0
         Name:            Base
         Type:            REG_SZ
         Data:            10

       Value 1
         Name:            Default
         Type:            REG_SZ
         Data:            8

       Value 2
         Name:            Max
         Type:            REG_SZ
         Data:            32

       Value 3
         Name:            Min
         Type:            REG_SZ
         Data:            1

       Value 4
         Name:            MiniHelp
         Type:            REG_SZ
         Data:

       Value 5
         Name:            ParamDesc
         Type:            REG_SZ
         Data:            Coalesce Buffers

       Value 6
         Name:            Scale
         Type:            REG_SZ
         Data:            1

       Value 7
         Name:            Step
         Type:            REG_SZ
         Data:            1

       Value 8
         Name:            Type
         Type:            REG_SZ
         Data:            int


       Key Name:
SYSTEM\CurrentControlSet\Services\E100B1\ProsetNdi\
                        Params\NumRfd
       Class Name:        <NO CLASS>
       Last Write Time:   2/12/99 - 2:14 PM
       Value 0
         Name:            Base
         Type:            REG_SZ
         Data:            10

       Value 1
         Name:            Default
         Type:            REG_SZ
         Data:            48

       Value 2
         Name:            Max
         Type:            REG_SZ
         Data:            1024

       Value 3
         Name:            Min
         Type:            REG_SZ
         Data:            1
```

```
        Value 4
          Name:             MiniHelp
          Type:             REG_SZ
          Data:

        Value 5
          Name:             ParamDesc
          Type:             REG_SZ
          Data:             Receive Buffers

        Value 6
          Name:             Scale
          Type:             REG_SZ
          Data:             1

        Value 7
          Name:             Step
          Type:             REG_SZ
          Data:             1

        Value 8
          Name:             Type
          Type:             REG_SZ
          Data:             int


        Key Name:
SYSTEM\CurrentControlSet\Services\E100B1\ProsetNdi\
                          Params\NumTcb
        Class Name:       <NO CLASS>
        Last Write Time:  2/12/99 - 2:14 PM
        Value 0
          Name:             Base
          Type:             REG_SZ
          Data:             10

        Value 1
          Name:             Default
          Type:             REG_SZ
          Data:             32

        Value 2
          Name:             Max
          Type:             REG_SZ
          Data:             80

        Value 3
          Name:             Min
          Type:             REG_SZ
          Data:             1

        Value 4
          Name:             MiniHelp
          Type:             REG_SZ
          Data:

        Value 5
          Name:             ParamDesc
          Type:             REG_SZ
          Data:             Transmit Control Blocks

        Value 6
          Name:             Scale
          Type:             REG_SZ
          Data:             1

        Value 7
          Name:             Step
          Type:             REG_SZ
          Data:             1

        Value 8
          Name:             Type
          Type:             REG_SZ
          Data:             int


        Key Name:
SYSTEM\CurrentControlSet\Services\E100B1\ProsetNdi\
                          Params\PacketTagging
        Class Name:       <NO CLASS>
        Last Write Time:  2/12/99 - 2:14 PM
        Value 0
          Name:             Default
          Type:             REG_SZ
          Data:             0

        Value 1
          Name:             MiniHelp
          Type:             REG_SZ
          Data:

        Value 2
          Name:             ParamDesc
          Type:             REG_SZ
          Data:             802.1p/802.1q Tagging

        Value 3
          Name:             Type
          Type:             REG_SZ
          Data:             enum


        Key Name:
SYSTEM\CurrentControlSet\Services\E100B1\ProsetNdi\
                          Params\PacketTagging\Enum
        Class Name:       <NO CLASS>
        Last Write Time:  2/12/99 - 2:14 PM
        Value 0
          Name:             0
          Type:             REG_SZ
          Data:             Disabled

        Value 1
          Name:             1
          Type:             REG_SZ
          Data:             Enabled
```

```
       Key Name:
SYSTEM\CurrentControlSet\Services\E100B1\ProsetNdi\
                        Params\Speed
       Class Name:      <NO CLASS>
       Last Write Time: 2/12/99 - 2:14 PM
       Value 0
         Name:          Default
         Type:          REG_SZ
         Data:          0

       Value 1
         Name:          MiniHelp
         Type:          REG_SZ
         Data:

       Value 2
         Name:          ParamDesc
         Type:          REG_SZ
         Data:          Speed

       Value 3
         Name:          Type
         Type:          REG_SZ
         Data:          enum


       Key Name:
SYSTEM\CurrentControlSet\Services\E100B1\ProsetNdi\
                        Params\Speed\Enum
       Class Name:      <NO CLASS>
       Last Write Time: 2/12/99 - 2:14 PM
       Value 0
         Name:          0
         Type:          REG_SZ
         Data:          Auto Detect

       Value 1
         Name:          10
         Type:          REG_SZ
         Data:          10 Mbps

       Value 2
         Name:          100
         Type:          REG_SZ
         Data:          100 Mbps


       Key Name:
SYSTEM\CurrentControlSet\Services\E100B1\ProsetNdi\
                        Params\Threshold
       Class Name:      <NO CLASS>
       Last Write Time: 2/12/99 - 2:14 PM
       Value 0
         Name:          Base
         Type:          REG_SZ
         Data:          10

       Value 1
         Name:          Default
         Type:          REG_SZ
         Data:          16

       Value 2
         Name:          Max
         Type:          REG_SZ
         Data:          200

       Value 3
         Name:          Min
         Type:          REG_SZ
         Data:          0

       Value 4
         Name:          MiniHelp
         Type:          REG_SZ
         Data:

       Value 5
         Name:          ParamDesc
         Type:          REG_SZ
         Data:          Adaptive Transmit Threshold

       Value 6
         Name:          Scale
         Type:          REG_SZ
         Data:          1

       Value 7
         Name:          Step
         Type:          REG_SZ
         Data:          1

       Value 8
         Name:          Type
         Type:          REG_SZ
         Data:          int


       Key Name:
SYSTEM\CurrentControlSet\Services\E100B1\ProsetNdi\
                        Params\UcodeSW
       Class Name:      <NO CLASS>
       Last Write Time: 2/12/99 - 2:14 PM
       Value 0
         Name:          Default
         Type:          REG_SZ
         Data:          1

       Value 1
         Name:          MiniHelp
         Type:          REG_SZ
         Data:

       Value 2
         Name:          ParamDesc
         Type:          REG_SZ
```

```
    Data:            Adaptive Technology

  Value 3
    Name:            Type
    Type:            REG_SZ
    Data:            enum


  Key Name:
SYSTEM\CurrentControlSet\Services\E100B1\ProsetNdi\
                     Params\UcodeSW\Enum
  Class Name:        <NO CLASS>
  Last Write Time:   2/12/99 - 2:14 PM
  Value 0
    Name:            0
    Type:            REG_SZ
    Data:            Off

  Value 1
    Name:            1
    Type:            REG_SZ
    Data:            On
```

Services/mraid

```
  Key Name:          SYSTEM\CurrentControlSet\Services\mraid
  Class Name:        <NO CLASS>
  Last Write Time:   2/15/99 - 2:07 PM
  Value 0
    Name:            ErrorControl
    Type:            REG_DWORD
    Data:            0

  Value 1
    Name:            Group
    Type:            REG_SZ
    Data:            Primary disk

  Value 2
    Name:            Start
    Type:            REG_DWORD
    Data:            0

  Value 3
    Name:            Tag
    Type:            REG_DWORD
    Data:            0x1

  Value 4
    Name:            Type
    Type:            REG_DWORD
    Data:            0x1


  Key Name:          SYSTEM\CurrentControlSet\Services\mraid\Enum
  Class Name:        <NO CLASS>
  Last Write Time:   3/1/99 - 11:12 AM
  Value 0
    Name:            0
    Type:            REG_SZ
    Data:            Root\LEGACY_MRAID\0000

  Value 1
    Name:            Count
    Type:            REG_DWORD
    Data:            0x1

  Value 2
    Name:            NextInstance
    Type:            REG_DWORD
    Data:            0x1
```

Services\MSDTC

```
Key Name:            SYSTEM\CurrentControlSet\Services\MSDTC
Class Name:          <NO CLASS>
Last Write Time:     1/11/99 - 11:31 AM
Value 0
  Name:              DependOnGroup
  Type:              REG_MULTI_SZ
  Data:

Value 1
  Name:              DependOnService
  Type:              REG_MULTI_SZ
  Data:              RPCSS
                     NTLMSSP


Value 2
  Name:              DisplayName
  Type:              REG_SZ
  Data:              MSDTC

Value 3
  Name:              ErrorControl
  Type:              REG_DWORD
  Data:              0x1

Value 4
  Name:              Group
  Type:              REG_SZ
  Data:              MS Transactions

Value 5
  Name:              ImagePath
  Type:              REG_EXPAND_SZ
  Data:              C:\WINNT\System32\msdtc.exe

Value 6
  Name:              ObjectName
  Type:              REG_SZ
  Data:              LocalSystem
```

```
      Value 7
        Name:            Start
        Type:            REG_DWORD
        Data:            0x3

      Value 8
        Name:            Tag
        Type:            REG_DWORD
        Data:            0x1

      Value 9
        Name:            Type
        Type:            REG_DWORD
        Data:            0x10


      Key Name:          SYSTEM\CurrentControlSet\Services\MSDTC\Security
      Class Name:        <NO CLASS>
      Last Write Time:   6/10/98 - 12:00 PM
      Value 0
        Name:            Security
        Type:            REG_BINARY
        Data:
      00000000   01 00 14 80 c0 00 00 00 - cc 00 00 00 14 00 00 00
........
      ........
      00000010   34 00 00 00 02 00 20 00 - 01 00 00 00 02 80 18 00
4..... .
      ........
      00000020   ff 01 0f 00 01 01 00 00 - 00 00 00 01 00 00 00 00
........
      ........
      00000030   20 02 00 00 02 00 8c 00 - 05 00 00 00 00 00 18 00
........
      ........
      00000040   8d 01 02 00 01 01 00 00 - 00 00 00 01 00 00 00 00
........
      ........
      00000050   00 00 00 00 00 00 1c 00 - fd 01 02 00 01 02 00 00
........
      ........
      00000060   00 00 00 05 20 00 00 00 - 23 02 00 00 00 00 00 00  ....
...
      #.......
      00000070   00 00 1c 00 ff 01 0f 00 - 01 02 00 00 00 00 00 05
........
      ........
      00000080   20 00 00 00 20 02 00 00 - 00 00 00 00 00 00 1c 00   ...
...
      ........
      00000090   ff 01 0f 00 01 02 00 00 - 00 00 00 05 20 00 00 00
........
      .... ...
      000000a0   25 02 00 00 00 00 00 00 - 00 00 18 00 fd 01 02 00
%.......
      ........
      000000b0   01 01 00 00 00 00 00 05 - 12 00 00 00 25 02 00 00
........
      ....%...
      000000c0   01 01 00 00 00 00 00 05 - 12 00 00 00 01 01 00 00
........
      ........
      000000d0   00 00 00 05 12 00 00 00 -
........
```

Services\MSSQLServer

```
      Key Name:          SYSTEM\CurrentControlSet\Services\MSSQLServer
      Class Name:        <NO CLASS>
      Last Write Time:   1/11/99 - 11:31 AM
      Value 0
        Name:            DisplayName
        Type:            REG_SZ
        Data:            MSSQLServer

      Value 1
        Name:            ErrorControl
        Type:            REG_DWORD
        Data:            0x1

      Value 2
        Name:            ImagePath
        Type:            REG_EXPAND_SZ
        Data:            C:\MSSQL7\binn\sqlservr.exe

      Value 3
        Name:            ObjectName
        Type:            REG_SZ
        Data:            LocalSystem

      Value 4
        Name:            Start
        Type:            REG_DWORD
        Data:            0x3

      Value 5
        Name:            Type
        Type:            REG_DWORD
        Data:            0x10


      Key Name:
SYSTEM\CurrentControlSet\Services\MSSQLServer\Enum
      Class Name:        <NO CLASS>
      Last Write Time:   3/1/99 - 11:12 AM
      Value 0
        Name:            0
        Type:            REG_SZ
        Data:            Root\LEGACY_MSSQLSERVER\0000

      Value 1
        Name:            Count
        Type:            REG_DWORD
        Data:            0x1

      Value 2
```

```
        Name:            NextInstance
        Type:            REG_DWORD
        Data:            0x1


      Key Name:
SYSTEM\CurrentControlSet\Services\MSSQLServer\Performance
      Class Name:        <NO CLASS>
      Last Write Time:   1/11/99 - 11:31 AM
      Value 0
        Name:            Close
        Type:            REG_SZ
        Data:            CloseSQLPerformanceData

      Value 1
        Name:            Collect
        Type:            REG_SZ
        Data:            CollectSQLPerformanceData

      Value 2
        Name:            First Counter
        Type:            REG_DWORD
        Data:            0x738

      Value 3
        Name:            First Help
        Type:            REG_DWORD
        Data:            0x739

      Value 4
        Name:            Last Counter
        Type:            REG_DWORD
        Data:            0x83a

      Value 5
        Name:            Last Help
        Type:            REG_DWORD
        Data:            0x83b

      Value 6
        Name:            Library
        Type:            REG_SZ
        Data:            SQLCTR70.DLL

      Value 7
        Name:            Open
        Type:            REG_SZ
        Data:            OpenSQLPerformanceData


      Key Name:
SYSTEM\CurrentControlSet\Services\MSSQLServer\Secur
                         ity
      Class Name:        <NO CLASS>
      Last Write Time:   1/11/99 - 11:28 AM
      Value 0
        Name:            Security
        Type:            REG_BINARY
        Data:
      00000000   01 00 14 80 c0 00 00 00 - cc 00 00 00 14 00 00 00
........
                 ........
      00000010   34 00 00 00 02 00 20 00 - 01 00 00 00 02 80 18 00
4..... .
                 ........
      00000020   ff 01 0f 00 01 01 00 00 - 00 00 00 01 00 00 00 00
........
                 ........
      00000030   20 02 00 00 02 00 8c 00 - 05 00 00 00 00 00 18 00
.......
                 ........
      00000040   8d 01 02 00 01 01 00 00 - 00 00 00 01 00 00 00 00
........
                 ........
      00000050   74 00 69 00 00 00 1c 00 - fd 01 02 00 01 02 00 00
t.i.....
                 ........
      00000060   00 00 00 05 20 00 00 00 - 23 02 00 00 6f 00 6e 00  ....
...
      #...o.n.
      00000070   00 00 1c 00 ff 01 0f 00 - 01 02 00 00 00 00 00 05
........
                 ........
      00000080   20 00 00 00 20 02 00 00 - 6f 00 6e 00 00 00 1c 00   ...
...
      o.n.....
      00000090   ff 01 0f 00 01 02 00 00 - 00 00 00 05 20 00 00 00
........
                 .... ...
      000000a0   25 02 00 00 6f 00 6e 00 - 00 00 18 00 fd 01 02 00
%...o.n.
                 ........
      000000b0   01 01 00 00 00 00 00 05 - 12 00 00 00 25 02 00 00
........
                 ....%...
      000000c0   01 01 00 00 00 00 00 05 - 12 00 00 00 01 01 00 00
........
                 ........
      000000d0   00 00 00 05 12 00 00 00 -
........
```

Services\NDIS

```
      Key Name:          SYSTEM\CurrentControlSet\Services\NDIS
      Class Name:        <NO CLASS>
      Last Write Time:   10/10/96 - 12:09 AM
      Value 0
        Name:            DisplayName
        Type:            REG_SZ
        Data:            Microsoft NDIS System Driver

      Value 1
        Name:            ErrorControl
        Type:            REG_DWORD
        Data:            0x1
```

```
      Value 2
        Name:            Group
        Type:            REG_SZ
        Data:            NDIS

      Value 3
        Name:            Start
        Type:            REG_DWORD
        Data:            0x1

      Value 4
        Name:            Type
        Type:            REG_DWORD
        Data:            0x1


      Key Name:          SYSTEM\CurrentControlSet\Services\NDIS\Enum
      Class Name:        <NO CLASS>
      Last Write Time:   3/1/99 - 11:12 AM
      Value 0
        Name:            0
        Type:            REG_SZ
        Data:            Root\LEGACY_NDIS\0000

      Value 1
        Name:            Count
        Type:            REG_DWORD
        Data:            0x1

      Value 2
        Name:            NextInstance
        Type:            REG_DWORD
        Data:            0x1


      Key Name:
SYSTEM\CurrentControlSet\Services\NDIS\MediaTypes
      Class Name:        <NO CLASS>
      Last Write Time:   10/10/96 - 12:09 AM

      Key Name:
SYSTEM\CurrentControlSet\Services\NDIS\Parameters
      Class Name:        <NO CLASS>
      Last Write Time:   6/10/98 - 1:17 PM
      Value 0
        Name:            ProcessorAffinityMask
        Type:            REG_DWORD
        Data:            0
```

Services\NetBIOS

```
      Key Name:          SYSTEM\CurrentControlSet\Services\NetBIOS
      Class Name:        <NO CLASS>
      Last Write Time:   6/10/98 - 4:07 AM
      Value 0
        Name:            DependOnGroup
        Type:            REG_MULTI_SZ
        Data:            TDI


      Value 1
        Name:            DependOnService
        Type:            REG_MULTI_SZ
        Data:

      Value 2
        Name:            DisplayName
        Type:            REG_SZ
        Data:            NetBIOS Interface

      Value 3
        Name:            ErrorControl
        Type:            REG_DWORD
        Data:            0x1

      Value 4
        Name:            Group
        Type:            REG_SZ
        Data:            NetBIOSGroup

      Value 5
        Name:            ImagePath
        Type:            REG_EXPAND_SZ
        Data:            \SystemRoot\System32\drivers\netbios.sys

      Value 6
        Name:            Start
        Type:            REG_DWORD
        Data:            0x3

      Value 7
        Name:            Type
        Type:            REG_DWORD
        Data:            0x2


      Key Name:          SYSTEM\CurrentControlSet\Services\NetBIOS\Enum
      Class Name:        <NO CLASS>
      Last Write Time:   6/17/98 - 6:46 PM
      Value 0
        Name:            0
        Type:            REG_SZ
        Data:            Root\LEGACY_NETBIOS\0000

      Value 1
        Name:            Count
        Type:            REG_DWORD
        Data:            0x1

      Value 2
        Name:            NextInstance
        Type:            REG_DWORD
        Data:            0x1
```

```
       Key Name:
SYSTEM\CurrentControlSet\Services\NetBIOS\Linkage
       Class Name:        GenericClass
       Last Write Time:   6/10/98 - 4:07 AM
       Value 0
         Name:            Bind
         Type:            REG_MULTI_SZ
         Data:            \Device\Nbf_E100B1


       Value 1
         Name:            Export
         Type:            REG_MULTI_SZ
         Data:            \Device\Netbios\Nbf_E100B1


       Value 2
         Name:            LanaMap
         Type:            REG_BINARY
         Data:
       00000000   01 01                                             ..

       Value 3
         Name:            Route
         Type:            REG_MULTI_SZ
         Data:            "Nbf" "E100B" "E100B1"



       Key Name:
SYSTEM\CurrentControlSet\Services\NetBIOS\Linkage\D
                        isabled
       Class Name:        GenericClass
       Last Write Time:   6/10/98 - 4:07 AM
       Value 0
         Name:            Bind
         Type:            REG_MULTI_SZ
         Data:            \Device\NetBT_E100B1


       Value 1
         Name:            Export
         Type:            REG_MULTI_SZ
         Data:            \Device\Netbios\NetBT_E100B1


       Value 2
         Name:            Route
         Type:            REG_MULTI_SZ
         Data:            "NetBT" "E100B" "E100B1"



       Key Name:
SYSTEM\CurrentControlSet\Services\NetBIOS\Parameter
                        s
       Class Name:        GenericClass
       Last Write Time:   6/10/98 - 4:05 AM
```

```
       Key Name:
SYSTEM\CurrentControlSet\Services\NetBIOS\Parameter
                        s\Winsock
       Class Name:        GenericClass
       Last Write Time:   6/10/98 - 4:05 AM
       Value 0
         Name:            HelperDllName
         Type:            REG_EXPAND_SZ
         Data:            %SystemRoot%\system32\wshnetbs.dll

       Value 1
         Name:            Mapping
         Type:            REG_BINARY
         Data:
       00000000   02 00 00 00 03 00 00 00 - 11 00 00 00 05 00 00 00
........
       ........
       00000010   00 00 00 00 11 00 00 00 - 02 00 00 00 00 00 00 00
........
       ........

       Value 2
         Name:            MaxSockAddrLength
         Type:            REG_DWORD
         Data:            0x14

       Value 3
         Name:            MinSockAddrLength
         Type:            REG_DWORD
         Data:            0x14



       Key Name:
SYSTEM\CurrentControlSet\Services\NetBIOS\Security
       Class Name:        <NO CLASS>
       Last Write Time:   6/10/98 - 4:05 AM
       Value 0
         Name:            Security
         Type:            REG_BINARY
         Data:
       00000000   01 00 14 80 cc 00 00 00 - d8 00 00 00 14 00 00 00
........
       ........
       00000010   34 00 00 00 02 00 20 00 - 01 00 00 00 02 80 18 00
4..... .
       ........
       00000020   ff 01 0f 00 01 01 00 00 - 00 00 00 01 00 00 00 00
........
       ........
       00000030   20 02 00 00 02 00 98 00 - 06 00 00 00 00 03 18 00
.......
       ........
       00000040   00 00 02 00 01 01 00 00 - 00 00 00 01 00 00 00 00
........
       ........
       00000050   00 00 00 00 00 03 18 00 - ff 01 0f 00 01 02 00 00
........
       ........
```

```
       00000060   00 00 00 05 20 00 00 00 - 20 02 00 00 00 03 18 00  ....
...
        .......
       00000070   ff 01 0f 00 01 01 00 00 - 00 00 00 05 12 00 00 00
........
       ........
       00000080   20 02 00 00 00 03 18 00 - 00 00 02 00 01 02 00 00
.......
       ........
       00000090   00 00 00 05 20 00 00 00 - 23 02 00 00 00 03 18 00  ....
...
       #.......
       000000a0   9d 00 00 00 01 01 00 00 - 00 00 00 05 04 00 00 00
........
       ........
       000000b0   23 02 00 00 00 03 18 00 - 9d 00 00 00 01 02 00 00
#.......
       ........
       000000c0   00 00 00 05 20 00 00 00 - 21 02 00 00 01 01 00 00  ....
...
       !.......
       000000d0   00 00 00 05 12 00 00 00 - 01 01 00 00 00 00 00 05
........
       ........
       000000e0   12 00 00 00                                       ....


       Key Name:
SYSTEM\CurrentControlSet\Services\NetBIOSInformatio
                          n
       Class Name:        GenericClass
       Last Write Time:   6/10/98 - 4:05 AM
       Value 0
         Name:            ErrorControl
         Type:            REG_DWORD
         Data:            0x1

       Value 1
         Name:            Start
         Type:            REG_DWORD
         Data:            0x3

       Value 2
         Name:            Type
         Type:            REG_DWORD
         Data:            0x4


       Key Name:
SYSTEM\CurrentControlSet\Services\NetBIOSInformatio
                          n\Linkage
       Class Name:        GenericClass
       Last Write Time:   6/10/98 - 4:05 AM

       Key Name:
SYSTEM\CurrentControlSet\Services\NetBIOSInformatio
                          n\Linkage\Disabled
       Class Name:        GenericClass
       Last Write Time:   6/10/98 - 4:05 AM


       Key Name:
SYSTEM\CurrentControlSet\Services\NetBIOSInformatio
                          n\Parameters
       Class Name:        GenericClass
       Last Write Time:   6/10/98 - 4:07 AM
       Value 0
         Name:            EnumExport1
         Type:            REG_DWORD
         Data:            0x1

       Value 1
         Name:            EnumExport2
         Type:            REG_DWORD
         Data:            0x1

       Value 2
         Name:            LanaNum1
         Type:            REG_DWORD
         Data:            0

       Value 3
         Name:            LanaNum2
         Type:            REG_DWORD
         Data:            0x1

       Value 4
         Name:            MaxLana
         Type:            REG_DWORD
         Data:            0x1

       Value 5
         Name:            Route
         Type:            REG_MULTI_SZ
         Data:            "NetBT" "E100B" "E100B1"
                          "Nbf" "E100B" "E100B1"
```

Services\NetBT

```
       Key Name:          SYSTEM\CurrentControlSet\Services\NetBT
       Class Name:        <NO CLASS>
       Last Write Time:   6/10/98 - 4:07 AM
       Value 0
         Name:            DependOnGroup
         Type:            REG_MULTI_SZ
         Data:

       Value 1
         Name:            DependOnService
         Type:            REG_MULTI_SZ
         Data:            Tcpip


       Value 2
         Name:            DisplayName
         Type:            REG_SZ
```

```
        Data:           WINS Client(TCP/IP)

      Value 3
        Name:           ErrorControl
        Type:           REG_DWORD
        Data:           0x1

      Value 4
        Name:           Group
        Type:           REG_SZ
        Data:           PNP_TDI

      Value 5
        Name:           ImagePath
        Type:           REG_EXPAND_SZ
        Data:           \SystemRoot\System32\drivers\netbt.sys

      Value 6
        Name:           Start
        Type:           REG_DWORD
        Data:           0x2

      Value 7
        Name:           Type
        Type:           REG_DWORD
        Data:           0x1


      Key Name:         SYSTEM\CurrentControlSet\Services\NetBT\Adapters
      Class Name:       GenericClass
      Last Write Time:  6/10/98 - 4:05 AM

      Key Name:
SYSTEM\CurrentControlSet\Services\NetBT\Adapters\E1
                        00B1
      Class Name:       GenericClass
      Last Write Time:  6/10/98 - 4:07 AM
      Value 0
        Name:           NameServer
        Type:           REG_SZ
        Data:

      Value 1
        Name:           NameServerBackup
        Type:           REG_SZ
        Data:



      Key Name:         SYSTEM\CurrentControlSet\Services\NetBT\Enum
      Class Name:       <NO CLASS>
      Last Write Time:  6/17/98 - 6:48 PM
      Value 0
        Name:           Count
        Type:           REG_DWORD
        Data:           0

      Value 1
        Name:           NextInstance
        Type:           REG_DWORD
        Data:           0


      Key Name:         SYSTEM\CurrentControlSet\Services\NetBT\Linkage
      Class Name:       GenericClass
      Last Write Time:  6/10/98 - 4:07 AM
      Value 0
        Name:           Bind
        Type:           REG_MULTI_SZ
        Data:

      Value 1
        Name:           Export
        Type:           REG_MULTI_SZ
        Data:

      Value 2
        Name:           OtherDependencies
        Type:           REG_MULTI_SZ
        Data:           Tcpip


      Value 3
        Name:           Route
        Type:           REG_MULTI_SZ
        Data:


      Key Name:
SYSTEM\CurrentControlSet\Services\NetBT\Linkage\Dis
                        abled
      Class Name:       GenericClass
      Last Write Time:  6/10/98 - 4:07 AM
      Value 0
        Name:           Bind
        Type:           REG_MULTI_SZ
        Data:           \Device\E100B1


      Value 1
        Name:           Export
        Type:           REG_MULTI_SZ
        Data:           \Device\NetBT_E100B1


      Value 2
        Name:           Route
        Type:           REG_MULTI_SZ
        Data:           "E100B" "E100B1"



      Key Name:
SYSTEM\CurrentControlSet\Services\NetBT\Parameters
      Class Name:       GenericClass
      Last Write Time:  6/10/98 - 4:07 AM
      Value 0
        Name:           BcastNameQueryCount
        Type:           REG_DWORD
```

```
  Data:             0x3

Value 1
  Name:             BcastQueryTimeout
  Type:             REG_DWORD
  Data:             0x2ee

Value 2
  Name:             CacheTimeout
  Type:             REG_DWORD
  Data:             0x927c0

Value 3
  Name:             EnableDNS
  Type:             REG_DWORD
  Data:             0

Value 4
  Name:             EnableLMHOSTS
  Type:             REG_DWORD
  Data:             0x1

Value 5
  Name:             EnableProxy
  Type:             REG_DWORD
  Data:             0

Value 6
  Name:             NameServerPort
  Type:             REG_DWORD
  Data:             0x89

Value 7
  Name:             NameSrvQueryCount
  Type:             REG_DWORD
  Data:             0x3

Value 8
  Name:             NameSrvQueryTimeout
  Type:             REG_DWORD
  Data:             0x5dc

Value 9
  Name:             NbProvider
  Type:             REG_SZ
  Data:             _tcp

Value 10
  Name:             ScopeID
  Type:             REG_SZ
  Data:

Value 11
  Name:             SessionKeepAlive
  Type:             REG_DWORD
  Data:             0x36ee80

Value 12
  Name:             Size/Small/Medium/Large
  Type:             REG_DWORD
  Data:             0x1

Value 13
  Name:             TransportBindName
  Type:             REG_SZ
  Data:             \Device\


Key Name:           SYSTEM\CurrentControlSet\Services\NetBT\Security
Class Name:         <NO CLASS>
Last Write Time:    6/10/98 - 4:05 AM
Value 0
  Name:             Security
  Type:             REG_BINARY
  Data:
00000000   01 00 14 80 c0 00 00 00 - cc 00 00 00 14 00 00 00
........
00000010   34 00 00 00 02 00 20 00 - 01 00 00 00 02 80 18 00
4..... .
00000020   ff 01 0f 00 01 01 00 00 - 00 00 00 01 00 00 00 00
........
00000030   20 02 00 00 02 00 8c 00 - 05 00 00 00 00 00 18 00
.......
00000040   8d 01 02 00 01 01 00 00 - 00 00 00 01 00 00 00 00
........
00000050   01 01 00 00 00 00 1c 00 - fd 01 02 00 01 02 00 00
........
00000060   00 00 00 05 20 00 00 00 - 23 02 00 00 00 00 00 05  ....
...
00000070   00 00 1c 00 ff 01 0f 00 - 01 02 00 00 00 00 00 05
........
00000080   20 00 00 00 20 02 00 00 - 00 00 00 05 00 00 1c 00   ...
...
00000090   ff 01 0f 00 01 02 00 00 - 00 00 00 05 20 00 00 00
........
000000a0   25 02 00 00 00 00 00 05 - 00 00 18 00 fd 01 02 00
%.......
000000b0   01 01 00 00 00 00 00 05 - 12 00 00 00 25 02 00 00
........
000000c0   01 01 00 00 00 00 00 05 - 12 00 00 00 01 01 00 00
........
000000d0   00 00 00 05 12 00 00 00 -
........
```

Services\PROSet

```
        Key Name:           SYSTEM\CurrentControlSet\Services\PROSet
        Class Name:         GenericClass
        Last Write Time:    6/10/98 - 3:01 AM

        Key Name:
SYSTEM\CurrentControlSet\Services\PROSet\Adapters
        Class Name:         GenericClass
        Last Write Time:    2/1/99 - 9:09 AM
        Value 0
          Name:             EPRO100
          Type:             REG_SZ
          Data:             Intel EtherExpress PRO Adapter


        Key Name:           SYSTEM\CurrentControlSet\Services\PROSet\EPRO100
        Class Name:         GenericClass
        Last Write Time:    2/1/99 - 9:09 AM
        Value 0
          Name:             AdapterDescription
          Type:             REG_SZ
          Data:             EPRO100_GetAdapterDescription

        Value 1
          Name:             Configure
          Type:             REG_SZ
          Data:             EPRO100_Configure

        Value 2
          Name:             Detect
          Type:             REG_SZ
          Data:             EPRO100_Detect

        Value 3
          Name:             DeviceExist
          Type:             REG_SZ
          Data:             EPRO100_DeviceExist

        Value 4
          Name:             Diagnose
          Type:             REG_SZ
          Data:             EPRO100_Diagnose

        Value 5
          Name:             DLL
          Type:             REG_SZ
          Data:             EPRO100.DLL

        Value 6
          Name:             GetExtendedFeatures
          Type:             REG_SZ
          Data:             EPRO100_GetExtendedFeatures

        Value 7
          Name:             Help
          Type:             REG_SZ
          Data:             E100SET.HLP

        Value 8
          Name:             InstallAnyway
          Type:             REG_SZ
          Data:             EPRO100_InstallAnyway

        Value 9
          Name:             RegistryKey
          Type:             REG_SZ
          Data:             EPRO100_GetRegistryKey

        Value 10
          Name:             Summary
          Type:             REG_SZ
          Data:             EPRO100_Resource_Summary


        Key Name:
SYSTEM\CurrentControlSet\Services\PROSet\EPRO100\Pa
                          rameters
        Class Name:         GenericClass
        Last Write Time:    2/1/99 - 9:09 AM
        Value 0
          Name:             Adaptive_IFS
          Type:             REG_SZ
          Data:             1,7,Adaptive Inter-Frame Spacing,0,2,1,0,255,1

        Value 1
          Name:             BusNumber
          Type:             REG_SZ
          Data:             0,7,BusNumber,0,2,0,0,16,1

        Value 2
          Name:             BusType
          Type:             REG_SZ
          Data:             0,7,BusType,0,2,5,2,5,1

        Value 3
          Name:             BusTypeLocal
          Type:             REG_SZ
          Data:             0,7,BusTypeLocal,0,2,5,2,5,1

        Value 4
          Name:             Eid
          Type:             REG_SZ
          Data:             0,7,Eid,0,2,0,0,4294967295,1

        Value 5
          Name:             Fifo
          Type:             REG_SZ
          Data:             0,3,Fifo Depth,0,2,12,0,15,1

        Value 6
          Name:             ForceDpx
          Type:             REG_SZ
          Data:             1,4,Duplex Mode,0,1,Auto,Auto,Half,Full

        Value 7
          Name:             MapRegisters
```

```
  Type:             REG_SZ
  Data:

Value 8
  Name:             MediaType
  Type:             REG_SZ
  Data:             0,7,MediaType,0,2,1,1,1,1

Value 9
  Name:             MsPciScan
  Type:             REG_SZ
  Data:             0,4,MsPciScan,0,2,1,0,1,1

Value 10
  Name:             NetworkAddress
  Type:             REG_SZ
  Data:             1,7,Locally Administered Address,0,5,0,0,1,1

Value 11
  Name:             NumCoalesce
  Type:             REG_SZ
  Data:             1,7,Coalesce Buffers,0,2,8,1,32,1

Value 12
  Name:             NumRfd
  Type:             REG_SZ
  Data:             1,7,Receive Buffers,0,2,32,1,1024,1

Value 13
  Name:             NumTbd
  Type:             REG_SZ
  Data:             0,3,Transmit Buffer Descriptors,0,2,64,1,65535,1

Value 14
  Name:             NumTbdPerTcb
  Type:             REG_SZ
  Data:             0,4,Transmit Buffers per Frame,0,2,12,1,16,1

Value 15
  Name:             NumTcb
  Type:             REG_SZ
  Data:             1,7,Transmit Control Blocks,0,2,16,1,80,1

Value 16
  Name:             Off
  Type:             REG_SZ
  Data:             1,3,Off Timer,0,2,2,1,65535,1

Value 17
  Name:             On
  Type:             REG_SZ
  Data:             1,3,On Timer,0,2,32768,1,65535,1

Value 18
  Name:             PerfOptims
  Type:             REG_SZ
  Data:             0,4,PerfOptims,0,2,0,0,65535,1

Value 19
  Name:             RxDmaCount
  Type:             REG_SZ
  Data:             0,4,RxDmaCount,0,2,0,0,63,1

Value 20
  Name:             RxFifo
  Type:             REG_SZ
  Data:             0,4,Receive Fifo Depth,0,2,8,0,15,1

Value 21
  Name:             Slot
  Type:             REG_SZ
  Data:

Value 22
  Name:             Speed
  Type:             REG_SZ
  Data:             1,7,Network
Speed,0,4,Auto,Auto,0,10Mbps,10,100Mbps
                    ,100

Value 23
  Name:             Threshold
  Type:             REG_SZ
  Data:             0,7,Transmit Threshold,0,2,16,0,200,1

Value 24
  Name:             TxDmaCount
  Type:             REG_SZ
  Data:             0,4,TxDmaCount,0,2,0,0,63,1

Value 25
  Name:             TxFifo
  Type:             REG_SZ
  Data:             0,4,Transmit Fifo Depth,0,2,8,0,15,1

Value 26
  Name:             Txmitwait
  Type:             REG_SZ
  Data:             0,7,Txmitwait,0,2,1,0,255,1

Value 27
  Name:             UcodeSW
  Type:             REG_SZ
  Data:             0,7,UcodeSW,0,2,1,0,1,1

Value 28
  Name:             UnderrunRetry
  Type:             REG_SZ
  Data:             0,4,UnderrunRetry,0,2,1,0,3,1
```

Services\Tcpip

```
Key Name:           SYSTEM\CurrentControlSet\Services\Tcpip
Class Name:         <NO CLASS>
Last Write Time:    6/10/98 - 3:06 AM
Value 0
```

```
  Name:             DisplayName
  Type:             REG_SZ
  Data:             TCP/IP Service

Value 1
  Name:             ErrorControl
  Type:             REG_DWORD
  Data:             0x1

Value 2
  Name:             Group
  Type:             REG_SZ
  Data:             PNP_TDI

Value 3
  Name:             ImagePath
  Type:             REG_EXPAND_SZ
  Data:             \SystemRoot\System32\drivers\tcpip.sys

Value 4
  Name:             Start
  Type:             REG_DWORD
  Data:             0x2

Value 5
  Name:             Type
  Type:             REG_DWORD
  Data:             0x1


Key Name:           SYSTEM\CurrentControlSet\Services\Tcpip\Enum
Class Name:         <NO CLASS>
Last Write Time:    3/1/99 - 11:12 AM
Value 0
  Name:             0
  Type:             REG_SZ
  Data:             Root\LEGACY_TCPIP\0000

Value 1
  Name:             Count
  Type:             REG_DWORD
  Data:             0x1

Value 2
  Name:             NextInstance
  Type:             REG_DWORD
  Data:             0x1


Key Name:           SYSTEM\CurrentControlSet\Services\Tcpip\Linkage
Class Name:         GenericClass
Last Write Time:    2/12/99 - 2:21 PM
Value 0
  Name:             Bind
  Type:             REG_MULTI_SZ
  Data:             \Device\E100B1


Value 1
  Name:             Export
  Type:             REG_MULTI_SZ
  Data:             \Device\Tcpip\E100B1


Value 2
  Name:             Route
  Type:             REG_MULTI_SZ
  Data:             "E100B" "E100B1"



Key Name:
SYSTEM\CurrentControlSet\Services\Tcpip\Linkage\Dis
                    abled
Class Name:         GenericClass
Last Write Time:    2/12/99 - 2:21 PM
Value 0
  Name:             Bind
  Type:             REG_MULTI_SZ
  Data:

Value 1
  Name:             Export
  Type:             REG_MULTI_SZ
  Data:

Value 2
  Name:             Route
  Type:             REG_MULTI_SZ
  Data:


Key Name:
SYSTEM\CurrentControlSet\Services\Tcpip\Parameters
Class Name:         GenericClass
Last Write Time:    2/12/99 - 2:15 PM
Value 0
  Name:             DataBasePath
  Type:             REG_EXPAND_SZ
  Data:             %SystemRoot%\System32\drivers\etc

Value 1
  Name:             Domain
  Type:             REG_SZ
  Data:             mv.unisys.com

Value 2
  Name:             EnableSecurityFilters
  Type:             REG_DWORD
  Data:             0

Value 3
  Name:             ForwardBroadcasts
  Type:             REG_DWORD
  Data:             0

Value 4
  Name:             Hostname
```

```
        Type:            REG_SZ
        Data:            avalon4

      Value 5
        Name:            IPEnableRouter
        Type:            REG_DWORD
        Data:            0

      Value 6
        Name:            KeepAliveInterval
        Type:            REG_DWORD
        Data:            0x2710

      Value 7
        Name:            KeepAliveTime
        Type:            REG_DWORD
        Data:            0x493e0

      Value 8
        Name:            NameServer
        Type:            REG_SZ
        Data:

      Value 9
        Name:            SearchList
        Type:            REG_SZ
        Data:

      Value 10
        Name:            TcpAverageRTT
        Type:            REG_DWORD
        Data:            0x3e8


      Key Name:
SYSTEM\CurrentControlSet\Services\Tcpip\Parameters\
                       PersistentRoutes
      Class Name:        GenericClass
      Last Write Time:   6/10/98 - 3:05 AM

      Key Name:
SYSTEM\CurrentControlSet\Services\Tcpip\Parameters\
                       Winsock
      Class Name:        GenericClass
      Last Write Time:   6/10/98 - 3:05 AM
      Value 0
        Name:            HelperDllName
        Type:            REG_EXPAND_SZ
        Data:            %SystemRoot%\System32\wshtcpip.dll

      Value 1
        Name:            Mapping
        Type:            REG_BINARY
        Data:
      00000000   0b 00 00 00 03 00 00 00 - 02 00 00 00 01 00 00 00
........
      ........
      00000010   06 00 00 00 02 00 00 00 - 01 00 00 00 00 00 00 00
........
      ........
      00000020   02 00 00 00 00 00 00 00 - 06 00 00 00 00 00 00 00
........
      ........
      00000030   00 00 00 00 06 00 00 00 - 00 00 00 00 01 00 00 00
........
      ........
      00000040   06 00 00 00 02 00 00 00 - 02 00 00 00 11 00 00 00
........
      ........
      00000050   02 00 00 00 02 00 00 00 - 00 00 00 00 02 00 00 00
........
      ........
      00000060   00 00 00 00 11 00 00 00 - 00 00 00 00 00 00 00 00
........
      ........
      00000070   11 00 00 00 00 00 00 00 - 02 00 00 00 11 00 00 00
........
      ........
      00000080   02 00 00 00 03 00 00 00 - 00 00 00 00
........
      ....

      Value 2
        Name:            MaxSockAddrLength
        Type:            REG_DWORD
        Data:            0x10

      Value 3
        Name:            MinSockAddrLength
        Type:            REG_DWORD
        Data:            0x10


      Key Name:
SYSTEM\CurrentControlSet\Services\Tcpip\Performance
      Class Name:        GenericClass
      Last Write Time:   6/10/98 - 3:05 AM
      Value 0
        Name:            Close
        Type:            REG_SZ
        Data:            CloseTcpIpPerformanceData

      Value 1
        Name:            Collect
        Type:            REG_SZ
        Data:            CollectTcpIpPerformanceData

      Value 2
        Name:            Library
        Type:            REG_SZ
        Data:            Perfctrs.dll

      Value 3
        Name:            Open
        Type:            REG_SZ
        Data:            OpenTcpIpPerformanceData
```

```
       Key Name:          SYSTEM\CurrentControlSet\Services\Tcpip\Security
       Class Name:        <NO CLASS>
       Last Write Time:   6/10/98 - 3:05 AM
       Value 0
         Name:            Security
         Type:            REG_BINARY
         Data:
       00000000   01 00 14 80 c0 00 00 00 - cc 00 00 00 14 00 00 00
........
       ........
       00000010   34 00 00 00 02 00 20 00 - 01 00 00 00 02 80 18 00
4..... .
       ........
       00000020   ff 01 0f 00 01 01 00 00 - 00 00 00 01 00 00 00 00
........
       ........
       00000030   20 02 00 00 02 00 8c 00 - 05 00 00 00 00 00 18 00
.......
       ........
       00000040   8d 01 02 00 01 01 00 00 - 00 00 00 01 00 00 00 00
........
       ........
       00000050   6d 00 00 00 00 00 1c 00 - fd 01 02 00 01 02 00 00
m.......
       ........
       00000060   00 00 00 05 20 00 00 00 - 23 02 00 00 43 00 48 00  ....
...
       #...C.H.
       00000070   00 00 1c 00 ff 01 0f 00 - 01 02 00 00 00 00 00 05
........
       ........
       00000080   20 00 00 00 20 02 00 00 - 43 00 48 00 00 00 1c 00   ...
...
       C.H.....
       00000090   ff 01 0f 00 01 02 00 00 - 00 00 00 05 20 00 00 00
........
       .... ...
       000000a0   25 02 00 00 43 00 48 00 - 00 00 18 00 fd 01 02 00
%...C.H.
       ........
       000000b0   01 01 00 00 00 00 00 05 - 12 00 00 00 25 02 00 00
........
       ....%...
       000000c0   01 01 00 00 00 00 00 05 - 12 00 00 00 01 01 00 00
........
       ........
       000000d0   00 00 00 05 12 00 00 00 -
........


       Key Name:
SYSTEM\CurrentControlSet\Services\Tcpip\ServiceProv
                          ider
       Class Name:        GenericClass
       Last Write Time:   6/10/98 - 3:05 AM
       Value 0
         Name:            Class
         Type:            REG_DWORD
         Data:            0x8

       Value 1
         Name:            DnsPriority
         Type:            REG_DWORD
         Data:            0x7d0

       Value 2
         Name:            HostsPriority
         Type:            REG_DWORD
         Data:            0x1f4

       Value 3
         Name:            LocalPriority
         Type:            REG_DWORD
         Data:            0x1f3

       Value 4
         Name:            Name
         Type:            REG_SZ
         Data:            TCP/IP

       Value 5
         Name:            NetbtPriority
         Type:            REG_DWORD
         Data:            0x7d1

       Value 6
         Name:            ProviderPath
         Type:            REG_EXPAND_SZ
         Data:            %SystemRoot%\System32\wsock32.dll
```

Services\WinSock

```
       Key Name:          SYSTEM\CurrentControlSet\Services\WinSock
       Class Name:        GenericClass
       Last Write Time:   6/10/98 - 4:05 AM
       Value 0
         Name:            ErrorControl
         Type:            REG_DWORD
         Data:            0x1

       Value 1
         Name:            Start
         Type:            REG_DWORD
         Data:            0x3

       Value 2
         Name:            Type
         Type:            REG_DWORD
         Data:            0x4


       Key Name:
SYSTEM\CurrentControlSet\Services\WinSock\Autodial
       Class Name:        <NO CLASS>
       Last Write Time:   6/10/98 - 11:59 AM
       Value 0
```

```
        Name:           AutodialDllName32
        Type:           REG_SZ
        Data:           wininet.dll

      Value 1
        Name:           AutodialFcnName32
        Type:           REG_SZ
        Data:           InternetAutodialCallback


      Key Name:
SYSTEM\CurrentControlSet\Services\WinSock\Linkage
      Class Name:       GenericClass
      Last Write Time:  6/10/98 - 4:05 AM

      Key Name:
SYSTEM\CurrentControlSet\Services\WinSock\Linkage\D
                        isabled
      Class Name:       GenericClass
      Last Write Time:  6/10/98 - 4:05 AM

      Key Name:
SYSTEM\CurrentControlSet\Services\WinSock\Parameter
                        s
      Class Name:       GenericClass
      Last Write Time:  6/10/98 - 4:05 AM
      Value 0
        Name:           Transports
        Type:           REG_MULTI_SZ
        Data:           Tcpip
                        NetBIOS


      Key Name:         SYSTEM\CurrentControlSet\Services\WinSock\Setup
Mig
                        ration
      Class Name:       <NO CLASS>
      Last Write Time:  6/10/98 - 4:07 AM
      Value 0
        Name:           Known Static Providers
        Type:           REG_MULTI_SZ
        Data:           Tcpip
                        NwlnkIpx
                        NwlnkSpx
                        AppleTalk
                        IsoTp


      Value 1
        Name:           Provider List
        Type:           REG_MULTI_SZ
        Data:           Tcpip
                        NetBIOS


      Value 2
        Name:           Setup Version
        Type:           REG_DWORD
        Data:           0x1009


      Key Name:         SYSTEM\CurrentControlSet\Services\WinSock\Setup
Mig
                        ration\Providers
      Class Name:       <NO CLASS>
      Last Write Time:  6/10/98 - 4:06 AM

      Key Name:         SYSTEM\CurrentControlSet\Services\WinSock\Setup
Mig
                        ration\Providers\NetBIOS
      Class Name:       <NO CLASS>
      Last Write Time:  6/10/98 - 4:07 AM
      Value 0
        Name:           WinSock 1.1 Provider Data
        Type:           REG_BINARY
        Data:
      00000000   0e 10 00 00 11 00 00 00 - 14 00 00 00 14 00 00 00
........
      ........
      00000010   05 00 00 00 ff ff ff ff - 00 fa 00 00 66 00 00 00
........
      ....f...
      00000020   09 12 00 00 11 00 00 00 - 14 00 00 00 14 00 00 00
........
      ........
      00000030   02 00 00 00 ff ff ff ff - 00 fa 00 00 40 00 00 00
........
      ....@...
      00000040   5c 00 44 00 65 00 76 00 - 69 00 63 00 65 00 5c 00
\.D.e.v.
      i.c.e.\.
      00000050   4e 00 62 00 66 00 5f 00 - 45 00 31 00 30 00 30 00
N.b.f._.
      E.1.0.0.
      00000060   42 00 31 00 00 00 5c 00 - 44 00 65 00 76 00 69 00
B.1...\.
      D.e.v.i.
      00000070   63 00 65 00 5c 00 4e 00 - 62 00 66 00 5f 00 45 00
c.e.\.N.
      b.f._.E.
      00000080   31 00 30 00 30 00 42 00 - 31 00 00 00
1.0.0.B.
      1...

      Value 1
        Name:           WinSock 2.0 Provider ID
        Type:           REG_BINARY
        Data:
      00000000   30 18 5f 8d 73 c2 cf 11 - 95 c8 00 80 5f 48 a1 92
0._.s...
      ...._H..


      Key Name:         SYSTEM\CurrentControlSet\Services\WinSock\Setup
Mig
                        ration\Providers\Tcpip
      Class Name:       <NO CLASS>
      Last Write Time:  6/10/98 - 4:06 AM
```

```
        Value 0
          Name:            WinSock 2.0 Provider ID
          Type:            REG_BINARY
          Data:
        00000000   a0 1a 0f e7 8b ab cf 11 - 8c a3 00 80 5f 48 a1 92
........
        ....._H..


        Key Name:          SYSTEM\CurrentControlSet\Services\WinSock\Setup
Mig
                           ration\Well Known Guids
        Class Name:        <NO CLASS>
        Last Write Time:   6/10/98 - 4:06 AM
        Value 0
          Name:            AppleTalk
          Type:            REG_BINARY
          Data:
        00000000   a0 17 3b 2c df c6 cf 11 - 95 c8 00 80 5f 48 a1 92
..;,....
        ....._H..

        Value 1
          Name:            IsoTp
          Type:            REG_BINARY
          Data:
        00000000   b0 cb e4 89 c1 b9 cf 11 - 95 c8 00 80 5f 48 a1 92
........
        ....._H..

        Value 2
          Name:            McsXns
          Type:            REG_BINARY
          Data:
        00000000   b1 cb e4 89 c1 b9 cf 11 - 95 c8 00 80 5f 48 a1 92
........
        ....._H..
```

Services\WinSock2

```
        Key Name:          SYSTEM\CurrentControlSet\Services\WinSock2
        Class Name:        <NO CLASS>
        Last Write Time:   6/10/98 - 4:01 AM

        Key Name:
SYSTEM\CurrentControlSet\Services\WinSock2\Paramete
                           rs
        Class Name:        <NO CLASS>
        Last Write Time:   6/10/98 - 4:06 AM
        Value 0
          Name:            Current_NameSpace_Catalog
          Type:            REG_SZ
          Data:            NameSpace_Catalog5

        Value 1
          Name:            Current_Protocol_Catalog
          Type:            REG_SZ
          Data:            Protocol_Catalog9

        Value 2
          Name:            WinSock_Registry_Version
          Type:            REG_SZ
          Data:            2.0


        Key Name:
SYSTEM\CurrentControlSet\Services\WinSock2\Paramete
                           rs\NameSpace_Catalog5
        Class Name:        <NO CLASS>
        Last Write Time:   6/10/98 - 4:05 AM
        Value 0
          Name:            Next_Provider_ID
          Type:            REG_DWORD
          Data:            0x7d0

        Value 1
          Name:            Num_Catalog_Entries
          Type:            REG_DWORD
          Data:            0x1


        Key Name:
SYSTEM\CurrentControlSet\Services\WinSock2\Paramete
                           rs\NameSpace_Catalog5\Catalog_Entries
        Class Name:        <NO CLASS>
        Last Write Time:   6/10/98 - 4:05 AM

        Key Name:
SYSTEM\CurrentControlSet\Services\WinSock2\Paramete

rs\NameSpace_Catalog5\Catalog_Entries\000000000001
        Class Name:        <NO CLASS>
        Last Write Time:   6/10/98 - 4:05 AM
        Value 0
          Name:            DisplayString
          Type:            REG_SZ
          Data:            TCP/IP

        Value 1
          Name:            Enabled
          Type:            REG_DWORD
          Data:            0x1

        Value 2
          Name:            LibraryPath
          Type:            REG_SZ
          Data:            %SystemRoot%\System32\rnr20.dll

        Value 3
          Name:            ProviderId
          Type:            REG_BINARY
          Data:
        00000000   40 9d 05 22 9e 7e cf 11 - ae 5a 00 aa 00 a7 11 2b
@.."."~..
        .Z.....+
```

```
       Value 4
         Name:             StoresServiceClassInfo
         Type:             REG_DWORD
         Data:             0x5e7

       Value 5
         Name:             SupportedNameSpace
         Type:             REG_DWORD
         Data:             0xc

       Value 6
         Name:             Version
         Type:             REG_DWORD
         Data:             0


       Key Name:
SYSTEM\CurrentControlSet\Services\WinSock2\Paramete
                         rs\Protocol_Catalog9
       Class Name:       <NO CLASS>
       Last Write Time:  6/10/98 - 4:07 AM
       Value 0
         Name:             Next_Catalog_Entry_ID
         Type:             REG_DWORD
         Data:             0x3f2

       Value 1
         Name:             Next_Provider_ID
         Type:             REG_DWORD
         Data:             0x1

       Value 2
         Name:             Num_Catalog_Entries
         Type:             REG_DWORD
         Data:             0x5


       Key Name:
SYSTEM\CurrentControlSet\Services\WinSock2\Paramete
                         rs\Protocol_Catalog9\Catalog_Entries
       Class Name:       <NO CLASS>
       Last Write Time:  6/10/98 - 4:07 AM

       Key Name:
SYSTEM\CurrentControlSet\Services\WinSock2\Paramete

rs\Protocol_Catalog9\Catalog_Entries\000000000001
       Class Name:       <NO CLASS>
       Last Write Time:  6/10/98 - 4:07 AM
       Value 0
         Name:             PackedCatalogItem
         Type:             REG_BINARY
         Data:
       00000000   25 53 79 73 74 65 6d 52 - 6f 6f 74 25 5c 73 79 73
%SystemR
       oot%\sys
       00000010   74 65 6d 33 32 5c 6d 73 - 61 66 64 2e 64 6c 6c 00
tem32\ms
       afd.dll.
       00000020   61 66 64 2e 64 6c 6c 00 - 76 00 65 00 72 00 20 00
afd.dll.
       v.e.r. .
       00000030   6e 00 6f 00 64 00 65 00 - 73 00 2c 00 20 00 66 00
n.o.d.e.
       s.,. .f.
       00000040   6f 00 72 00 20 00 77 00 - 68 00 69 00 63 00 68 00  o.r.
.w.
       h.i.c.h.
       00000050   20 00 74 00 68 00 65 00 - 72 00 65 00 20 00 61 00
.t.h.e.
       r.e. .a.
       00000060   72 00 65 00 20 00 73 00 - 65 00 70 00 61 00 72 00  r.e.
.s.
       e.p.a.r.
       00000070   61 00 74 00 65 00 20 00 - 69 00 74 00 65 00 6d 00
a.t.e. .
       i.t.e.m.
       00000080   73 00 20 00 74 00 6f 00 - 20 00 62 00 65 00 0d 00  s.
.t.o.
        .b.e...
       00000090   0a 00 3b 00 20 00 70 00 - 72 00 65 00 73 00 65 00  ..;.
.p.
       r.e.s.e.
       000000a0   6e 00 74 00 65 00 64 00 - 20 00 74 00 6f 00 20 00
n.t.e.d.
        .t.o. .
       000000b0   74 00 68 00 65 00 20 00 - 75 00 73 00 65 00 72 00
t.h.e. .
       u.s.e.r.
       000000c0   2e 00 20 00 20 00 54 00 - 68 00 65 00 73 00 65 00  .. .
.T.
       h.e.s.e.
       000000d0   20 00 63 00 6f 00 6d 00 - 62 00 69 00 6e 00 61 00
.c.o.m.
       b.i.n.a.
       000000e0   74 00 69 00 6f 00 6e 00 - 20 00 6e 00 6f 00 64 00
t.i.o.n.
        .n.o.d.
       000000f0   65 00 73 00 20 00 61 00 - 72 00 65 00 20 00 6f 00  e.s.
.a.
       r.e. .o.
       00000100   6e 00 6c 00 66 00 02 00 - 00 00 00 00 00 00 00 00
n.l.f...
       ........
       00000110   00 00 00 00 08 00 00 00 - a0 1a 0f e7 8b ab cf 11
........
       ........
       00000120   8c a3 00 80 5f 48 a1 92 - e9 03 00 00 01 00 00 00
...._H..
       ........
       00000130   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000140   00 00 00 00 00 00 00 00 - 00 00 00 00 02 00 00 00
........
       ........
       00000150   02 00 00 00 10 00 00 00 - 10 00 00 00 01 00 00 00
........
```

```
        ........
        00000160   06 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000170   00 00 00 00 00 00 00 00 - 4d 00 53 00 41 00 46 00
........
        M.S.A.F.
        00000180   44 00 20 00 54 00 63 00 - 70 00 69 00 70 00 20 00  D.
.T.c.
        p.i.p. .
        00000190   5b 00 54 00 43 00 50 00 - 2f 00 49 00 50 00 5d 00
[.T.C.P.
        /.I.P.].
        000001a0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        000001b0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        000001c0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        000001d0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        000001e0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        000001f0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000200   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000210   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000220   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000230   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000240   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000250   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000260   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000270   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000280   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000290   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        000002a0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        000002b0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        000002c0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        000002d0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        000002e0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        000002f0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000300   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000310   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000320   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000330   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000340   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000350   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000360   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000370   00 00 00 00 00 00 00 00 -
........


        Key Name:
SYSTEM\CurrentControlSet\Services\WinSock2\Paramete

rs\Protocol_Catalog9\Catalog_Entries\000000000002
        Class Name:         <NO CLASS>
        Last Write Time:    6/10/98 - 4:07 AM
        Value 0
          Name:             PackedCatalogItem
          Type:             REG_BINARY
          Data:
        00000000   25 53 79 73 74 65 6d 52 - 6f 6f 74 25 5c 73 79 73
%SystemR
        oot%\sys
```

```
       00000010   74 65 6d 33 32 5c 6d 73 - 61 66 64 2e 64 6c 6c 00
tem32\ms
       afd.dll.
       00000020   61 66 64 2e 64 6c 6c 00 - 76 00 65 00 72 00 20 00
afd.dll.
       v.e.r. .
       00000030   6e 00 6f 00 64 00 65 00 - 73 00 2c 00 20 00 66 00
n.o.d.e.
       s.,. .f.
       00000040   6f 00 72 00 20 00 77 00 - 68 00 69 00 63 00 68 00  o.r.
.w.
       h.i.c.h.
       00000050   20 00 74 00 68 00 65 00 - 72 00 65 00 20 00 61 00
.t.h.e.
       r.e. .a.
       00000060   72 00 65 00 20 00 73 00 - 65 00 70 00 61 00 72 00  r.e.
.s.
       e.p.a.r.
       00000070   61 00 74 00 65 00 20 00 - 69 00 74 00 65 00 6d 00
a.t.e. .
       i.t.e.m.
       00000080   73 00 20 00 74 00 6f 00 - 20 00 62 00 65 00 0d 00  s.
.t.o.
        .b.e...
       00000090   0a 00 3b 00 20 00 70 00 - 72 00 65 00 73 00 65 00  ..;.
.p.
       r.e.s.e.
       000000a0   6e 00 74 00 65 00 64 00 - 20 00 74 00 6f 00 20 00
n.t.e.d.
        .t.o. .
       000000b0   74 00 68 00 65 00 20 00 - 75 00 73 00 65 00 72 00
t.h.e. .
       u.s.e.r.
       000000c0   2e 00 20 00 20 00 54 00 - 68 00 65 00 73 00 65 00  .. .
.T.
       h.e.s.e.
       000000d0   20 00 63 00 6f 00 6d 00 - 62 00 69 00 6e 00 61 00
.c.o.m.
       b.i.n.a.
       000000e0   74 00 69 00 6f 00 6e 00 - 20 00 6e 00 6f 00 64 00
t.i.o.n.
        .n.o.d.
       000000f0   65 00 73 00 20 00 61 00 - 72 00 65 00 20 00 6f 00  e.s.
.a.
       r.e. .o.
       00000100   6e 00 6c 00 09 06 02 00 - 00 00 00 00 00 00 00 00
n.l.....
       ........
       00000110   00 00 00 00 08 00 00 00 - a0 1a 0f e7 8b ab cf 11
........
       ........
       00000120   8c a3 00 80 5f 48 a1 92 - ea 03 00 00 01 00 00 00
...._H..
       ........
       00000130   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000140   00 00 00 00 00 00 00 00 - 00 00 00 00 02 00 00 00
........
       ........
       00000150   02 00 00 00 10 00 00 00 - 10 00 00 00 02 00 00 00
........
       ........
       00000160   11 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000170   bb ff 00 00 00 00 00 00 - 4d 00 53 00 41 00 46 00
........
       M.S.A.F.
       00000180   44 00 20 00 54 00 63 00 - 70 00 69 00 70 00 20 00  D.
.T.c.
       p.i.p. .
       00000190   5b 00 55 00 44 00 50 00 - 2f 00 49 00 50 00 5d 00
[.U.D.P.
       /.I.P.].
       000001a0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       000001b0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       000001c0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       000001d0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       000001e0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       000001f0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000200   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000210   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000220   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000230   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000240   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000250   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000260   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000270   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
```

```
       00000280   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000290   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       000002a0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       000002b0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       000002c0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       000002d0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       000002e0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       000002f0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000300   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000310   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000320   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000330   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000340   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000350   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000360   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000370   00 00 00 00 00 00 00 00 -
........


       Key Name:
SYSTEM\CurrentControlSet\Services\WinSock2\Paramete

rs\Protocol_Catalog9\Catalog_Entries\000000000003
       Class Name:        <NO CLASS>
       Last Write Time:   6/10/98 - 4:07 AM
       Value 0
         Name:            PackedCatalogItem
         Type:            REG_BINARY
         Data:
```

```
       00000000   25 53 79 73 74 65 6d 52 - 6f 6f 74 25 5c 73 79 73
%SystemR
       oot%\sys
       00000010   74 65 6d 33 32 5c 6d 73 - 61 66 64 2e 64 6c 6c 00
tem32\ms
       afd.dll.
       00000020   61 66 64 2e 64 6c 6c 00 - 76 00 65 00 72 00 20 00
afd.dll.
       v.e.r. .
       00000030   6e 00 6f 00 64 00 65 00 - 73 00 2c 00 20 00 66 00
n.o.d.e.
       s.,. .f.
       00000040   6f 00 72 00 20 00 77 00 - 68 00 69 00 63 00 68 00  o.r.
.w.
       h.i.c.h.
       00000050   20 00 74 00 68 00 65 00 - 72 00 65 00 20 00 61 00
.t.h.e.
       r.e. .a.
       00000060   72 00 65 00 20 00 73 00 - 65 00 70 00 61 00 72 00  r.e.
.s.
       e.p.a.r.
       00000070   61 00 74 00 65 00 20 00 - 69 00 74 00 65 00 6d 00
a.t.e. .
       i.t.e.m.
       00000080   73 00 20 00 74 00 6f 00 - 20 00 62 00 65 00 0d 00  s.
.t.o.
        .b.e...
       00000090   0a 00 3b 00 20 00 70 00 - 72 00 65 00 73 00 65 00  ..;.
.p.
       r.e.s.e.
       000000a0   6e 00 74 00 65 00 64 00 - 20 00 74 00 6f 00 20 00
n.t.e.d.
        .t.o. .
       000000b0   74 00 68 00 65 00 20 00 - 75 00 73 00 65 00 72 00
t.h.e. .
       u.s.e.r.
       000000c0   2e 00 20 00 20 00 54 00 - 68 00 65 00 73 00 65 00  .. .
.T.
       h.e.s.e.
       000000d0   20 00 63 00 6f 00 6d 00 - 62 00 69 00 6e 00 61 00
.c.o.m.
       b.i.n.a.
       000000e0   74 00 69 00 6f 00 6e 00 - 20 00 6e 00 6f 00 64 00
t.i.o.n.
        .n.o.d.
       000000f0   65 00 73 00 20 00 61 00 - 72 00 65 00 20 00 6f 00  e.s.
.a.
       r.e. .o.
       00000100   6e 00 6c 00 09 06 02 00 - 00 00 00 00 00 00 00 00
n.l.....
       ........
       00000110   00 00 00 00 0c 00 00 00 - a0 1a 0f e7 8b ab cf 11
........
       ........
       00000120   8c a3 00 80 5f 48 a1 92 - eb 03 00 00 01 00 00 00
...._H..
       ........
       00000130   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
```

```
        ........
        00000140   00 00 00 00 00 00 00 00 - 00 00 00 00 02 00 00 00
........
        ........
        00000150   02 00 00 00 10 00 00 00 - 10 00 00 00 03 00 00 00
........
        ........
        00000160   00 00 00 00 ff 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000170   bb ff 00 00 00 00 00 00 - 4d 00 53 00 41 00 46 00
........
        M.S.A.F.
        00000180   44 00 20 00 54 00 63 00 - 70 00 69 00 70 00 20 00  D.
.T.c.
        p.i.p. .
        00000190   5b 00 52 00 41 00 57 00 - 2f 00 49 00 50 00 5d 00
[.R.A.W.
        /.I.P.].
        000001a0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        000001b0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        000001c0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        000001d0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        000001e0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        000001f0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000200   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000210   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000220   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000230   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000240   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000250   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000260   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000270   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000280   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000290   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        000002a0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        000002b0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        000002c0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        000002d0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        000002e0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        000002f0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000300   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000310   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000320   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000330   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000340   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000350   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000360   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
        ........
        00000370   00 00 00 00 00 00 00 00 -
........


        Key Name:
SYSTEM\CurrentControlSet\Services\WinSock2\Paramete

rs\Protocol_Catalog9\Catalog_Entries\000000000004
        Class Name:        <NO CLASS>
        Last Write Time:   6/10/98 - 4:07 AM
        Value 0
```

```
        Name:           PackedCatalogItem
        Type:           REG_BINARY
        Data:
       00000000   25 53 79 73 74 65 6d 52 - 6f 6f 74 25 5c 73 79 73
%SystemR
       oot%\sys
       00000010   74 65 6d 33 32 5c 6d 73 - 61 66 64 2e 64 6c 6c 00
tem32\ms
       afd.dll.
       00000020   61 66 64 2e 64 6c 6c 00 - 76 00 65 00 72 00 20 00
afd.dll.
       v.e.r. .
       00000030   6e 00 6f 00 64 00 65 00 - 73 00 2c 00 20 00 66 00
n.o.d.e.
       s.,. .f.
       00000040   6f 00 72 00 20 00 77 00 - 68 00 69 00 63 00 68 00  o.r.
.w.
       h.i.c.h.
       00000050   20 00 74 00 68 00 65 00 - 72 00 65 00 20 00 61 00
.t.h.e.
       r.e. .a.
       00000060   72 00 65 00 20 00 73 00 - 65 00 70 00 61 00 72 00  r.e.
.s.
       e.p.a.r.
       00000070   61 00 74 00 65 00 20 00 - 69 00 74 00 65 00 6d 00
a.t.e. .
       i.t.e.m.
       00000080   73 00 20 00 74 00 6f 00 - 20 00 62 00 65 00 0d 00  s.
.t.o.
        .b.e...
       00000090   0a 00 3b 00 20 00 70 00 - 72 00 65 00 73 00 65 00  ..;.
.p.
       r.e.s.e.
       000000a0   6e 00 74 00 65 00 64 00 - 20 00 74 00 6f 00 20 00
n.t.e.d.
        .t.o. .
       000000b0   74 00 68 00 65 00 20 00 - 75 00 73 00 65 00 72 00
t.h.e. .
       u.s.e.r.
       000000c0   2e 00 20 00 20 00 54 00 - 68 00 65 00 73 00 65 00  .. .
.T.
       h.e.s.e.
       000000d0   20 00 63 00 6f 00 6d 00 - 62 00 69 00 6e 00 61 00
.c.o.m.
       b.i.n.a.
       000000e0   74 00 69 00 6f 00 6e 00 - 20 00 6e 00 6f 00 64 00
t.i.o.n.
        .n.o.d.
       000000f0   65 00 73 00 20 00 61 00 - 72 00 65 00 20 00 6f 00  e.s.
.a.
       r.e. .o.
       00000100   6e 00 6c 00 0e 00 02 00 - 00 00 00 00 00 00 00 00
n.l.....
       ........
       00000110   00 00 00 00 00 00 00 00 - 30 18 5f 8d 73 c2 cf 11
........
       0._.s...
       00000120   95 c8 00 80 5f 48 a1 92 - f0 03 00 00 01 00 00 00
...._H..
       ........
       00000130   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000140   00 00 00 00 00 00 00 00 - 00 00 00 00 02 00 00 00
........
       ........
       00000150   11 00 00 00 14 00 00 00 - 14 00 00 00 05 00 00 00
........
       ........
       00000160   ff ff ff ff 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000170   00 fa 00 00 00 00 00 00 - 4d 00 53 00 41 00 46 00
........
       M.S.A.F.
       00000180   44 00 20 00 4e 00 65 00 - 74 00 42 00 49 00 4f 00  D.
.N.e.
       t.B.I.O.
       00000190   53 00 20 00 5b 00 5c 00 - 44 00 65 00 76 00 69 00  S.
.[.\.
       D.e.v.i.
       000001a0   63 00 65 00 5c 00 4e 00 - 62 00 66 00 5f 00 45 00
c.e.\.N.
       b.f._.E.
       000001b0   31 00 30 00 30 00 42 00 - 31 00 5d 00 20 00 53 00
1.0.0.B.
       1.]. .S.
       000001c0   45 00 51 00 50 00 41 00 - 43 00 4b 00 45 00 54 00
E.Q.P.A.
       C.K.E.T.
       000001d0   20 00 31 00 00 00 00 00 - 00 00 00 00 00 00 00 00
.1.....
       ........
       000001e0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       000001f0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000200   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000210   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000220   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000230   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000240   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
       00000250   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
........
       ........
```

```
       00000260   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       ........
       00000270   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       00000280   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       00000290   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       000002a0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       000002b0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       000002c0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       000002d0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       000002e0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       000002f0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       00000300   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       00000310   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       00000320   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       00000330   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       00000340   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       00000350   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       00000360   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       ........
       00000370   00 00 00 00 00 00 00 00 -
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       Key Name:
SYSTEM\CurrentControlSet\Services\WinSock2\Paramete

rs\Protocol_Catalog9\Catalog_Entries\000000000005
       Class Name:        <NO CLASS>
       Last Write Time:   6/10/98 - 4:07 AM
       Value 0
         Name:            PackedCatalogItem
         Type:            REG_BINARY
         Data:
       00000000   25 53 79 73 74 65 6d 52 - 6f 6f 74 25 5c 73 79 73
%SystemR
       oot%\sys
       00000010   74 65 6d 33 32 5c 6d 73 - 61 66 64 2e 64 6c 6c 00
tem32\ms
       afd.dll.
       00000020   61 66 64 2e 64 6c 6c 00 - 76 00 65 00 72 00 20 00
afd.dll.
       v.e.r. .
       00000030   6e 00 6f 00 64 00 65 00 - 73 00 2c 00 20 00 66 00
n.o.d.e.
       s.,. .f.
       00000040   6f 00 72 00 20 00 77 00 - 68 00 69 00 63 00 68 00  o.r.
.w.
       h.i.c.h.
       00000050   20 00 74 00 68 00 65 00 - 72 00 65 00 20 00 61 00
.t.h.e.
       r.e. .a.
       00000060   72 00 65 00 20 00 73 00 - 65 00 70 00 61 00 72 00  r.e.
.s.
       e.p.a.r.
       00000070   61 00 74 00 65 00 20 00 - 69 00 74 00 65 00 6d 00
a.t.e. .
       i.t.e.m.
       00000080   73 00 20 00 74 00 6f 00 - 20 00 62 00 65 00 0d 00  s.
.t.o.
        .b.e...
       00000090   0a 00 3b 00 20 00 70 00 - 72 00 65 00 73 00 65 00  ..;.
.p.
       r.e.s.e.
       000000a0   6e 00 74 00 65 00 64 00 - 20 00 74 00 6f 00 20 00
n.t.e.d.
        .t.o. .
       000000b0   74 00 68 00 65 00 20 00 - 75 00 73 00 65 00 72 00
t.h.e. .
       u.s.e.r.
       000000c0   2e 00 20 00 20 00 54 00 - 68 00 65 00 73 00 65 00  .. .
.T.
       h.e.s.e.
       000000d0   20 00 63 00 6f 00 6d 00 - 62 00 69 00 6e 00 61 00
.c.o.m.
       b.i.n.a.
       000000e0   74 00 69 00 6f 00 6e 00 - 20 00 6e 00 6f 00 64 00
t.i.o.n.
        .n.o.d.
       000000f0   65 00 73 00 20 00 61 00 - 72 00 65 00 20 00 6f 00  e.s.
.a.
       r.e. .o.
       00000100   6e 00 6c 00 09 02 02 00 - 00 00 00 00 00 00 00 00
n.l.....
       ........
       00000110   00 00 00 00 00 00 00 00 - 30 18 5f 8d 73 c2 cf 11
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       0._.s...
       00000120   95 c8 00 80 5f 48 a1 92 - f1 03 00 00 01 00 00 00
....._H..
       ........
       00000130   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       ........
       00000140   00 00 00 00 00 00 00 00 - 00 00 00 00 02 00 00 00
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       ........
       00000150   11 00 00 00 14 00 00 00 - 14 00 00 00 02 00 00 00
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       ........
       00000160   ff ff ff ff 00 00 00 00 - 00 00 00 00 00 00 00 00
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       ........
       00000170   00 fa 00 00 00 00 00 00 - 4d 00 53 00 41 00 46 00
........
       M.S.A.F.
       00000180   44 00 20 00 4e 00 65 00 - 74 00 42 00 49 00 4f 00  D.
.N.e.
       t.B.I.O.
       00000190   53 00 20 00 5b 00 5c 00 - 44 00 65 00 76 00 69 00  S.
.[.\.
       D.e.v.i.
       000001a0   63 00 65 00 5c 00 4e 00 - 62 00 66 00 5f 00 45 00
c.e.\.N.
       b.f._.E.
       000001b0   31 00 30 00 30 00 42 00 - 31 00 5d 00 20 00 44 00
1.0.0.B.
       1.]. .D.
       000001c0   41 00 54 00 41 00 47 00 - 52 00 41 00 4d 00 20 00
A.T.A.G.
       R.A.M. .
       000001d0   31 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       000001e0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       000001f0   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       00000200   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       00000210   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       00000220   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       00000230   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       00000240   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       00000250   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       00000260   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       00000340   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       00000350   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       00000360   00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
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       00000370   00 00 00 00 00 00 00 00 -
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```

NT Client Configuration Information

```
Microsoft Diagnostics Report For \\CLIENT1
------------------------------------------------------------------------

OS Version Report
------------------------------------------------------------------------
Microsoft (R) Windows NT (TM) Server
Version 4.0 (Build 1381: Service Pack 4) x86 Multiprocessor Free
Registered Owner: Unisys, Unisys
Product Number: 01397-OEM-0018032-66306
------------------------------------------------------------------------

System Report
------------------------------------------------------------------------
System: AT/AT COMPATIBLE
Hardware Abstraction Layer: MPS 1.4 - APIC platform
BIOS Date: 07/18/98
BIOS Version: <unavailable>

Processor list:
   0:  x86 Family 6 Model 5 Stepping 2 GenuineIntel ~449 Mhz
   1:  x86 Family 6 Model 5 Stepping 2 GenuineIntel ~449 Mhz
------------------------------------------------------------------------

Video Display Report
------------------------------------------------------------------------
BIOS Date: 05/21/97
BIOS Version: CL-GD5446 PCI VGA BIOS Version 1.33

Adapter:
   Setting: 800 x 600 x 256
            60 Hz
   Type: cirrus compatible display adapter
   String: Cirrus Logic Compatible
   Memory: 1 MB
   Chip Type: Cirrus Logic 5446
   DAC Type: Integrated RAMDAC
Driver:
   Vendor: Microsoft Corporation
   File(s): cirrus.sys, vga.dll, cirrus.dll, vga256.dll, vga64K.dll
   Version: 4.00, 4.0.0


Drives Report
------------------------------------------------------------------------
C:\  (Local - NTFS)  Total: 4,160,803 KB, Free: 3,333,739 KB
   Serial Number: 6802 - BFA0
   Bytes per cluster: 512
   Sectors per cluster: 1
   Filename length: 255

Memory Report
------------------------------------------------------------------------
Handles: 1,240
Threads: 112
Processes: 14

Physical Memory (K)
   Total: 523,696
   Available: 475,140
   File Cache: 15,356

Kernel Memory (K)
   Total: 24,556
   Paged: 9,100
   Nonpaged: 15,456

Commit Charge (K)
   Total: 26,020
   Limit: 1,019,912
   Peak: 344,004

Pagefile Space (K)
   Total: 524,288
   Total in use: 4,460
   Peak: 108,612

   C:\pagefile.sys
      Total: 524,288
      Total in use: 4,460
      Peak: 108,612



Services Report
------------------------------------------------------------------------
Alerter                                          Stopped   (Manual)
   C:\WINNT\System32\services.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Shared Process
   Service Dependencies:
      LanmanWorkstation
Computer Browser                                 Running   (Automatic)
   C:\WINNT\System32\services.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Shared Process
   Service Dependencies:
      LanmanWorkstation
      LanmanServer
      LmHosts
ClipBook Server                                  Stopped   (Manual)
   C:\WINNT\system32\clipsrv.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process
   Service Dependencies:
      NetDDE
DHCP Client (TDI)                                Stopped   (Disabled)
   C:\WINNT\System32\services.exe
   Service Account Name: LocalSystem
```

```
   Error Severity: Normal
   Service Flags: Shared Process
   Service Dependencies:
      Tcpip
      Afd
      NetBT
EventLog (Event log)                          Running   (Automatic)
   C:\WINNT\system32\services.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Shared Process
Adaptec Failover Backup Monitor               Stopped   (Manual)
   C:\WINNT\System32\forbmon.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process
Server                                        Running   (Automatic)
   C:\WINNT\System32\services.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Shared Process
   Group Dependencies:
      TDI
Workstation (NetworkProvider)                 Running   (Automatic)
   C:\WINNT\System32\services.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Shared Process
   Group Dependencies:
      TDI
License Logging Service                       Stopped   (Manual)
   C:\WINNT\System32\llssrv.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process
TCP/IP NetBIOS Helper                         Running   (Automatic)
   C:\WINNT\System32\services.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Shared Process
   Group Dependencies:
      NetworkProvider
Messenger                                     Stopped   (Manual)
   C:\WINNT\System32\services.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Shared Process
   Service Dependencies:
      LanmanWorkstation
      NetBios
Network DDE (NetDDEGroup)                     Stopped   (Manual)
   C:\WINNT\system32\netdde.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Shared Process
   Service Dependencies:
      NetDDEDSDM
Network DDE DSDM                              Stopped   (Manual)
   C:\WINNT\system32\netdde.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Shared Process
Net Logon (RemoteValidation)                  Stopped   (Manual)
   C:\WINNT\System32\lsass.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Shared Process
   Service Dependencies:
      LanmanWorkstation
      LmHosts
NT LM Security Support Provider               Running   (Manual)
   C:\WINNT\System32\SERVICES.EXE
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Shared Process
Plug and Play (PlugPlay)                      Running   (Automatic)
   C:\WINNT\system32\services.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Shared Process
Protected Storage                             Running   (Automatic)
   c:\winnt\system32\pstores.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process, Interactive
   Service Dependencies:
      RpcSs
Remote Command Server                         Running   (Automatic)
   C:\WINNT\System32\rcmdsvc.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process
   Service Dependencies:
      LanmanServer
Directory Replicator                          Stopped   (Manual)
   C:\WINNT\System32\lmrepl.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process
   Service Dependencies:
      LanmanWorkstation
      LanmanServer
Remote Procedure Call (RPC) Locator           Stopped   (Manual)
   C:\WINNT\System32\LOCATOR.EXE
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process
   Service Dependencies:
      LanmanWorkstation
      Rdr
Remote Procedure Call (RPC) Service           Running   (Automatic)
   C:\WINNT\system32\RpcSs.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process
Schedule                                      Stopped   (Manual)
   C:\WINNT\System32\AtSvc.Exe
   Service Account Name: LocalSystem
```

```
   Error Severity: Normal
   Service Flags: Own Process
Spooler (SpoolerGroup)                          Stopped   (Manual)
   C:\WINNT\system32\spoolss.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process, Interactive
Telephony Service                               Stopped   (Manual)
   C:\WINNT\system32\tapisrv.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process
TUXEDO IPC Helper                               Stopped   (Automatic)
   C:\TUXEDO\bin\tuxipc.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process
TListen (Port: 3050)                            Stopped   (Manual)
   C:\TUXEDO\bin\slisten.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process
UPS                                             Stopped   (Manual)
   C:\WINNT\System32\ups.exe
   Service Account Name: LocalSystem
   Error Severity: Normal
   Service Flags: Own Process
World Wide Web Publishing Service               Stopped   (Manual)
   C:\WINNT\System32\inetsrv\inetinfo.exe
   Service Account Name: LocalSystem
   Error Severity: Ignore
   Service Flags: Shared Process
   Service Dependencies:
      RPCSS
      NTLMSSP



Drivers Report
--------------------------------------------------------------------------
Abiosdsk (Primary disk)                         Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
AFD Networking Support Environment (TDI)        Running   (Automatic)
   C:\WINNT\System32\drivers\afd.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Aha154x (SCSI miniport)                         Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Aha174x (SCSI miniport)                         Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
aic78xx (SCSI miniport)                         Running   (Boot)
   C:\WINNT\System32\DRIVERS\aic78xx.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Always (SCSI miniport)                          Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
ami0nt (SCSI miniport)                          Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
amsint (SCSI miniport)                          Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Arrow (SCSI miniport)                           Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
atapi (SCSI miniport)                           Running   (Boot)
   C:\WINNT\System32\DRIVERS\atapi.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Atdisk (Primary disk)                           Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
ati (Video)                                     Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Beep (Base)                                     Running   (System)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
BusLogic (SCSI miniport)                        Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Busmouse (Pointer Port)                         Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Cdaudio (Filter)                                Stopped   (System)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Cdfs (File system)                              Running   (Disabled)
   Error Severity: Normal
   Service Flags: File System Driver, Shared Process
   Group Dependencies:
      SCSI CDROM Class
Cdrom (SCSI CDROM Class)                        Running   (System)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
   Group Dependencies:
      SCSI miniport
Changer (Filter)                                Stopped   (System)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
cirrus (Video)                                  Running   (System)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Cpqarray (SCSI miniport)                        Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
cpqfws2e (SCSI miniport)                        Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
dac960nt (SCSI miniport)                        Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
dce376nt (SCSI miniport)                        Stopped   (Disabled)
   Error Severity: Normal
```

```
   Service Flags: Kernel Driver, Shared Process
Delldsa (SCSI miniport)                         Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Dell_DGX (Video)                                Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Disk (SCSI Class)                               Running   (Boot)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
   Group Dependencies:
      SCSI miniport
Diskperf (Filter)                               Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
DptScsi (SCSI miniport)                         Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
dtc329x (SCSI miniport)                         Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Adaptec EMPCI Adapter Driver (NDIS)             Running   (Automatic)
   C:\WINNT\System32\drivers\EMPCI.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
et4000 (Video)                                  Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Fastfat (Boot file system)                      Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: File System Driver, Shared Process
Fd16_700 (SCSI miniport)                        Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Fd7000ex (SCSI miniport)                        Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Fd8xx (SCSI miniport)                           Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
flashpnt (SCSI miniport)                        Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Floppy (Primary disk)                           Running   (System)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Ftdisk (Filter)                                 Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
HP 10/100TX PCI Ethernet Adapter Driver (NDIS) Running   (Automatic)
   C:\WINNT\System32\drivers\hptxnt.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
i8042 Keyboard and PS/2 Mouse Port Driver (Keyboard Port) Running
(System)
   System32\DRIVERS\i8042prt.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Inport (Pointer Port)                           Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Jazzg300 (Video)                                Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Jazzg364 (Video)                                Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Jzvxl484 (Video)                                Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Keyboard Class Driver (Keyboard Class)          Running   (System)
   System32\DRIVERS\kbdclass.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
KSecDD (Base)                                   Running   (System)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
mga (Video)                                     Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
mga_mil (Video)                                 Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
mitsumi (SCSI miniport)                         Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
mkecr5xx (SCSI miniport)                        Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Modem (Extended base)                           Stopped   (Manual)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Mouse Class Driver (Pointer Class)              Running   (System)
   System32\DRIVERS\mouclass.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Msfs (File system)                              Running   (System)
   Error Severity: Normal
   Service Flags: File System Driver, Shared Process
Mup (Network)                                   Running   (Manual)
   C:\WINNT\System32\drivers\mup.sys
   Error Severity: Normal
   Service Flags: File System Driver, Shared Process
NetBEUI Protocol (PNP_TDI)                      Running   (Automatic)
   C:\WINNT\System32\drivers\nbf.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Ncr53c9x (SCSI miniport)                        Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
ncr77c22 (Video)                                Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Ncrc700 (SCSI miniport)                         Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Ncrc710 (SCSI miniport)                         Stopped   (Disabled)
   Error Severity: Normal
```

```
   Service Flags: Kernel Driver, Shared Process
Microsoft NDIS System Driver (NDIS)          Running   (System)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
NetBIOS Interface (NetBIOSGroup)             Stopped   (Manual)
   C:\WINNT\System32\drivers\netbios.sys
   Error Severity: Normal
   Service Flags: File System Driver, Shared Process
   Group Dependencies:
      TDI
WINS Client(TCP/IP) (PNP_TDI)                Stopped   (Automatic)
   C:\WINNT\System32\drivers\netbt.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
   Service Dependencies:
      Tcpip
NetDetect                                    Running   (Manual)
   C:\WINNT\system32\drivers\netdtect.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Npfs (File system)                           Running   (System)
   Error Severity: Normal
   Service Flags: File System Driver, Shared Process
Ntfs (File system)                           Running   (Disabled)
   Error Severity: Normal
   Service Flags: File System Driver, Shared Process
Null (Base)                                  Running   (System)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Oliscsi (SCSI miniport)                      Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Parallel (Extended base)                     Running   (Automatic)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
   Service Dependencies:
      Parport
   Group Dependencies:
      Parallel arbitrator
Parport (Parallel arbitrator)                Running   (Automatic)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
ParVdm (Extended base)                       Running   (Automatic)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
   Service Dependencies:
      Parport
   Group Dependencies:
      Parallel arbitrator
PCIDump (PCI Configuration)                  Stopped   (System)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Pcmcia (System Bus Extender)                 Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
PnP ISA Enabler Driver (Base)                Stopped   (System)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
psidisp (Video)                              Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Ql10wnt (SCSI miniport)                      Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
qv (Video)                                   Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Rdr (Network)                                Running   (Manual)
   C:\WINNT\System32\drivers\rdr.sys
   Error Severity: Normal
   Service Flags: File System Driver, Shared Process
s3 (Video)                                   Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Scsiprnt (Extended base)                     Stopped   (Automatic)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
   Group Dependencies:
      SCSI miniport
Scsiscan (SCSI Class)                        Stopped   (System)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
   Group Dependencies:
      SCSI miniport
Serial (Extended base)                       Running   (Automatic)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Sermouse (Pointer Port)                      Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Sfloppy (Primary disk)                       Stopped   (System)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
   Group Dependencies:
      SCSI miniport
Simbad (Filter)                              Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
slcd32 (SCSI miniport)                       Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Sparrow (SCSI miniport)                      Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Spock (SCSI miniport)                        Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Srv (Network)                                Running   (Manual)
   C:\WINNT\System32\drivers\srv.sys
   Error Severity: Normal
   Service Flags: File System Driver, Shared Process
symc810 (SCSI miniport)                      Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
T128 (SCSI miniport)                         Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
T13B (SCSI miniport)                         Stopped   (Disabled)
```

```
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
TCP/IP Service (PNP_TDI)                    Running   (Automatic)
   C:\WINNT\System32\drivers\tcpip.sys
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
tga (Video)                                 Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
tmv1 (SCSI miniport)                        Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Ultra124 (SCSI miniport)                    Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Ultra14f (SCSI miniport)                    Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
Ultra24f (SCSI miniport)                    Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
update (Base)                               Stopped   (System)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
v7vram (Video)                              Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
VgaSave (Video Save)                        Stopped   (System)
   C:\WINNT\System32\drivers\vga.sys
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
VgaStart (Video Init)                       Stopped   (System)
   C:\WINNT\System32\drivers\vga.sys
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Wd33c93 (SCSI miniport)                     Stopped   (Disabled)
   Error Severity: Normal
   Service Flags: Kernel Driver, Shared Process
wd90c24a (Video)                            Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
wdvga (Video)                               Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
weitekp9 (Video)                            Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process
Xga (Video)                                 Stopped   (Disabled)
   Error Severity: Ignore
   Service Flags: Kernel Driver, Shared Process



IRQ and Port Report
-------------------------------------------------------------------------
Devices                       Vector Level  Affinity
-------------------------------------------------------------------------
MPS 1.4 - APIC platform            8     8 0x00000003
MPS 1.4 - APIC platform            0     0 0x00000003
MPS 1.4 - APIC platform            1     1 0x00000003
MPS 1.4 - APIC platform            2     2 0x00000003
MPS 1.4 - APIC platform            3     3 0x00000003
MPS 1.4 - APIC platform            4     4 0x00000003
MPS 1.4 - APIC platform            5     5 0x00000003
MPS 1.4 - APIC platform            6     6 0x00000003
MPS 1.4 - APIC platform            7     7 0x00000003
MPS 1.4 - APIC platform            8     8 0x00000003
MPS 1.4 - APIC platform            9     9 0x00000003
MPS 1.4 - APIC platform           10    10 0x00000003
MPS 1.4 - APIC platform           11    11 0x00000003
MPS 1.4 - APIC platform           12    12 0x00000003
MPS 1.4 - APIC platform           13    13 0x00000003
MPS 1.4 - APIC platform           14    14 0x00000003
MPS 1.4 - APIC platform           15    15 0x00000003
MPS 1.4 - APIC platform           16    16 0x00000003
MPS 1.4 - APIC platform           17    17 0x00000003
MPS 1.4 - APIC platform           18    18 0x00000003
MPS 1.4 - APIC platform           19    19 0x00000003
MPS 1.4 - APIC platform           20    20 0x00000003
MPS 1.4 - APIC platform           21    21 0x00000003
MPS 1.4 - APIC platform           22    22 0x00000003
MPS 1.4 - APIC platform           23    23 0x00000003
MPS 1.4 - APIC platform           24    24 0x00000003
MPS 1.4 - APIC platform           25    25 0x00000003
MPS 1.4 - APIC platform           26    26 0x00000003
MPS 1.4 - APIC platform           27    27 0x00000003
MPS 1.4 - APIC platform           28    28 0x00000003
MPS 1.4 - APIC platform           29    29 0x00000003
MPS 1.4 - APIC platform           30    30 0x00000003
MPS 1.4 - APIC platform           31    31 0x00000003
MPS 1.4 - APIC platform           32    32 0x00000003
MPS 1.4 - APIC platform           33    33 0x00000003
MPS 1.4 - APIC platform           34    34 0x00000003
MPS 1.4 - APIC platform           35    35 0x00000003
MPS 1.4 - APIC platform           36    36 0x00000003
MPS 1.4 - APIC platform           37    37 0x00000003
MPS 1.4 - APIC platform           38    38 0x00000003
MPS 1.4 - APIC platform           39    39 0x00000003
MPS 1.4 - APIC platform           40    40 0x00000003
MPS 1.4 - APIC platform           41    41 0x00000003
MPS 1.4 - APIC platform           42    42 0x00000003
MPS 1.4 - APIC platform           43    43 0x00000003
MPS 1.4 - APIC platform           44    44 0x00000003
MPS 1.4 - APIC platform           45    45 0x00000003
MPS 1.4 - APIC platform           46    46 0x00000003
MPS 1.4 - APIC platform           47    47 0x00000003
MPS 1.4 - APIC platform           61    61 0x00000003
MPS 1.4 - APIC platform           65    65 0x00000003
MPS 1.4 - APIC platform           80    80 0x00000003
MPS 1.4 - APIC platform          193   193 0x00000003
MPS 1.4 - APIC platform          225   225 0x00000003
MPS 1.4 - APIC platform          253   253 0x00000003
MPS 1.4 - APIC platform          254   254 0x00000003
MPS 1.4 - APIC platform          255   255 0x00000003
i8042prt                           1     1 0xffffffff
i8042prt                          12    12 0xffffffff
Serial                             4     4 0x00000000
Serial                             3     3 0x00000000
```

```
EMPCI                            16    16 0x00000000
EMPCI                            16    16 0x00000000
EMPCI                            16    16 0x9bcb8280
EMPCI                            16    16 0x00000000
Floppy                            6     6 0x00000000
HPTX                             36    36 0x00000000
HPTX                              8     8 0x00000000
HPTX                             12    12 0x00000000
HPTX                             16    16 0x00000000
HPTX                             32    32 0x00000000
aic78xx                          40    40 0x00000000
atapi                             0    14 0x00000000
-------------------------------------------------------------------
Devices                       Physical Address  Length
-------------------------------------------------------------------
MPS 1.4 - APIC platform         0x00000000  0x0000000010
MPS 1.4 - APIC platform         0x00000020  0x0000000002
MPS 1.4 - APIC platform         0x00000040  0x0000000004
MPS 1.4 - APIC platform         0x00000048  0x0000000004
MPS 1.4 - APIC platform         0x00000061  0x0000000001
MPS 1.4 - APIC platform         0x00000070  0x0000000002
MPS 1.4 - APIC platform         0x00000080  0x0000000010
MPS 1.4 - APIC platform         0x00000092  0x0000000001
MPS 1.4 - APIC platform         0x000000a0  0x0000000002
MPS 1.4 - APIC platform         0x000000c0  0x0000000010
MPS 1.4 - APIC platform         0x000000f0  0x0000000010
i8042prt                        0x00000060  0x0000000001
i8042prt                        0x00000064  0x0000000001
Parport                         0x00000378  0x0000000003
Serial                          0x000003f8  0x0000000007
Serial                          0x000002f8  0x0000000007
EMPCI                           0x0000dc00  0x0000000080
EMPCI                           0x0000d880  0x0000000080
EMPCI                           0x0000d800  0x0000000080
EMPCI                           0x0000d480  0x0000000080
Floppy                          0x000003f0  0x0000000006
Floppy                          0x000003f7  0x0000000001
HPTX                            0x0000fca0  0x000000001c
HPTX                            0x0000ece0  0x000000001c
HPTX                            0x0000ecc0  0x000000001c
HPTX                            0x0000eca0  0x000000001c
HPTX                            0x0000fcc0  0x000000001c
aic78xx                         0x0000f800  0x0000000100
atapi                           0x000001f0  0x0000000008
atapi                           0x000003f6  0x0000000001
cirrus                          0x000003b0  0x000000000c
cirrus                          0x000003c0  0x0000000020


DMA and Memory Report
-------------------------------------------------------------------
Devices                       Channel    Port
-------------------------------------------------------------------
Floppy                            2     0
-------------------------------------------------------------------
Devices                       Physical Address  Length
-------------------------------------------------------------------
MPS 1.4 - APIC platform         0xfec00000  0x00000400
MPS 1.4 - APIC platform         0xfee00000  0x00000400
HPTX                            0xfedfc000  0x0000001c
HPTX                            0xfbffe000  0x0000001c
HPTX                            0xfbffd000  0x0000001c
HPTX                            0xfbffc000  0x0000001c
HPTX                            0xfedfd000  0x0000001c
aic78xx                         0xfedff000  0x00001000
cirrus                          0x000a0000  0x00020000
cirrus                          0xfc000000  0x02000000



Environment Report
-------------------------------------------------------------------



System Environment Variables
   APPDIR=c:\tuxedo\runtime
   ComSpec=C:\WINNT\system32\cmd.exe
   LIBPATH=c:\tuxedo\lib
   NUMBER_OF_PROCESSORS=2
   OS=Windows_NT
   Os2LibPath=C:\WINNT\system32\os2\dll;
   Path=C:\WINNT\system32;C:\WINNT;C:\TUXEDO\bin;C:\MSSQL7\BINN
   PROCESSOR_ARCHITECTURE=x86
   PROCESSOR_IDENTIFIER=x86 Family 6 Model 5 Stepping 2, GenuineIntel
   PROCESSOR_LEVEL=6
   PROCESSOR_REVISION=0502
   TMCONTEXTS=1
   TUXCONFIG=c:\tuxedo\runtime\tuxconfig
   TUXDIR=c:\tuxedo
   windir=C:\WINNT



Environment Variables for Current User
   TEMP=C:\TEMP
   TMP=C:\TEMP



Network Report
-------------------------------------------------------------------
Your Access Level: Admin & Local
Workgroup or Domain: WORKGROUP
Network Version: 4.0
LanRoot: WORKGROUP
Logged On Users: 1
Current User (1): Administrator
  Logon Domain: CLIENT1
  Logon Server: CLIENT1

Transport: Nbf_HPTX1, 00-90-27-27-9D-BD, VC's: 1, Wan: Wan
Transport: Nbf_HPTX2, 00-90-27-27-9E-5E, VC's: 0, Wan: Wan
Transport: Nbf_HPTX3, 00-A0-C9-EA-AA-71, VC's: 0, Wan: Wan
Transport: Nbf_HPTX4, 00-A0-C9-EA-A9-30, VC's: 0, Wan: Wan
Transport: Nbf_HPTX5, 00-A0-C9-EA-CD-4D, VC's: 0, Wan: Wan
Transport: Nbf_EMPCI6, 00-00-92-A7-C2-BC, VC's: 0, Wan: Wan
```

```
Transport: Nbf_EMPCI7, 00-00-92-A7-C2-BD, VC's: 0, Wan: Wan
Transport: Nbf_EMPCI8, 00-00-92-A7-C2-BE, VC's: 0, Wan: Wan
Transport: Nbf_EMPCI9, 00-00-92-A7-C2-BF, VC's: 0, Wan: Wan

Character Wait: 3,600
Collection Time: 250
Maximum Collection Count: 16
Keep Connection: 600
Maximum Commands: 5
Session Time Out: 45
Character Buffer Size: 512
Maximum Threads: 17
Lock Quota: 6,144
Lock Increment: 10
Maximum Locks: 500
Pipe Increment: 10
Maximum Pipes: 500
Cache Time Out: 40
Dormant File Limit: 45
Read Ahead Throughput: 4,294,967,295
Mailslot Buffers: 3
Server Announce Buffers: 20
Illegal Datagrams: 5
Datagram Reset Frequency: 60
Log Election Packets: False
Use Opportunistic Locking: True
Use Unlock Behind: True
Use Close Behind: True
Buffer Pipes: True
Use Lock, Read, Unlock: True
Use NT Caching: True
Use Raw Read: True
Use Raw Write: True
Use Write Raw Data: True
Use Encryption: True
Buffer Deny Write Files: True
Buffer Read Only Files: True
Force Core Creation: True
512 Byte Max Transfer: False
Bytes Received: 417,335
SMB's Received: 4,363
Paged Read Bytes Requested: 0
Non Paged Read Bytes Requested: 0
Cache Read Bytes Requested: 0
Network Read Bytes Requested: 0
Bytes Transmitted: 477,993
SMB's Transmitted: 4,363
Paged Read Bytes Requested: 0
Non Paged Read Bytes Requested: 0
Cache Read Bytes Requested: 0
Network Read Bytes Requested: 0
Initally Failed Operations: 0
Failed Completion Operations: 0
Read Operations: 0
Random Read Operations: 0
Read SMB's: 0
Large Read SMB's: 0
Small Read SMB's: 0
Write Operations: 0
Random Write Operations: 0
Write SMB's: 0
Large Write SMB's: 0
Small Write SMB's: 0
Raw Reads Denied: 0
Raw Writes Denied: 0
Network Errors: 0
Sessions: 715
Failed Sessions: 0
Reconnects: 0
Core Connects: 0
LM 2.0 Connects: 0
LM 2.x Connects: 0
Windows NT Connects: 715
Server Disconnects: 8
Hung Sessions: 0
Use Count: 1,427
Failed Use Count: 1
Current Commands: 0
Server File Opens: 867
Server Device Opens: 0
Server Jobs Queued: 0
Server Session Opens: 1
Server Sessions Timed Out: 28
Server Sessions Errored Out: 29
Server Password Errors: 0
Server Permission Errors: 0
Server System Errors: 0
Server Bytes Sent: 132,417,151
Server Bytes Received: 12,267,331
Server Average Response Time: 0
Server Request Buffers Needed: 0
Server Big Buffers Needed: 0
```

Internet Information Server Registry Parameters

```
\registry\machine\system\currentcontrolset\services\inetinfo
    Parameters
        BandwidthLevel = REG_DWORD 0xffffffff
        ListenBackLog = REG_DWORD 0x00000019
        DisableMemoryCache = REG_DWORD 0x00000001
        MemoryCacheSize = REG_DWORD 0x00000000
        PoolThreadLimit = REG_DWORD 0x00000100
        ObjectCacheTTL = REG_DWORD 0xffffffff
        Filter
            FilterType = REG_DWORD 0x00000000
            NumGrantSites = REG_DWORD 0x00000000
            NumDenySites = REG_DWORD 0x00000000
        MimeMap
            text/html,htm,,h =
            image/gif,gif,,g =
            image/jpeg,jpg,,: =
            text/plain,txt,,0 =
            text/html,html,,h =
            image/jpeg,jpeg,,: =
            image/jpeg,jpe,,: =
            image/bmp,bmp,,: =
            application/octet-stream,*,,5 =
```

```
application/pdf,pdf,,5 =
application/octet-stream,bin,,5 =
application/oda,oda,,5 =
application/zip,zip,,9 =
application/rtf,rtf,,5 =
application/postscript,ps,,5 =
application/postscript,ai,,5 =
application/postscript,eps,,5 =
application/mac-binhex40,hqx,,4 =
application/msword,doc,,5 =
application/msword,dot,,5 =
application/winhlp,hlp,,5 =
video/mpeg,mpeg,,; =
video/mpeg,mpg,,; =
video/mpeg,mpe,,; =
video/x-msvideo,avi,,< =
video/quicktime,qt,,; =
video/quicktime,mov,,; =
video/x-sgi-movie,movie,,< =
x-world/x-vrml,wrl,,5 =
x-world/x-vrml,xaf,,5 =
x-world/x-vrml,xof,,5 =
x-world/x-vrml,flr,,5 =
x-world/x-vrml,wrz,,5 =
application/x-director,dcr,,5 =
application/x-director,dir,,5 =
application/x-director,dxr,,5 =
image/cis-cod,cod,,5 =
image/x-cmx,cmx,,5 =
application/envoy,evy,,5 =
application/x-msaccess,mdb,,5 =
application/x-mscardfile,crd,,5 =
application/x-msclip,clp,,5 =
application/octet-stream,exe,,5 =
application/x-msexcel,xla,,5 =
application/x-msexcel,xlc,,5 =
application/x-msexcel,xlm,,5 =
application/x-msexcel,xls,,5 =
application/x-msexcel,xlt,,5 =
application/x-msexcel,xlw,,5 =
application/x-msmediaview,m13,,5 =
application/x-msmediaview,m14,,5 =
application/x-msmoney,mny,,5 =
application/x-mspowerpoint,ppt,,5 =
application/x-msproject,mpp,,5 =
application/x-mspublisher,pub,,5 =
application/x-msterminal,trm,,5 =
application/x-msworks,wks,,5 =
application/x-mswrite,wri,,5 =
application/x-msmetafile,wmf,,5 =
application/x-csh,csh,,5 =
application/x-dvi,dvi,,5 =
application/x-hdf,hdf,,5 =
application/x-latex,latex,,5 =
application/x-netcdf,nc,,5 =
application/x-netcdf,cdf,,5 =
application/x-sh,sh,,5 =
application/x-tcl,tcl,,5 =
application/x-tex,tex,,5 =
        application/x-texinfo,texinfo,,5 =
        application/x-texinfo,texi,,5 =
        application/x-troff,t,,5 =
        application/x-troff,tr,,5 =
        application/x-troff,roff,,5 =
        application/x-troff-man,man,,5 =
        application/x-troff-me,me,,5 =
        application/x-troff-ms,ms,,5 =
        application/x-wais-source,src,,7 =
        application/x-bcpio,bcpio,,5 =
        application/x-cpio,cpio,,5 =
        application/x-gtar,gtar,,9 =
        application/x-shar,shar,,5 =
        application/x-sv4cpio,sv4cpio,,5 =
        application/x-sv4crc,sv4crc,,5 =
        application/x-tar,tar,,5 =
        application/x-ustar,ustar,,5 =
        audio/basic,au,,< =
        audio/basic,snd,,< =
        audio/x-aiff,aif,,< =
        audio/x-aiff,aiff,,< =
        audio/x-aiff,aifc,,< =
        audio/x-wav,wav,,< =
        audio/x-pn-realaudio,ram,,< =
        image/ief,ief,,: =
        image/tiff,tiff,,: =
        image/tiff,tif,,: =
        image/x-cmu-raster,ras,,: =
        image/x-portable-anymap,pnm,,: =
        image/x-portable-bitmap,pbm,,: =
        image/x-portable-graymap,pgm,,: =
        image/x-portable-pixmap,ppm,,: =
        image/x-rgb,rgb,,: =
        image/x-xbitmap,xbm,,: =
        image/x-xpixmap,xpm,,: =
        image/x-xwindowdump,xwd,,: =
        text/html,stm,,h =
        text/plain,bas,,0 =
        text/plain,c,,0 =
        text/plain,h,,0 =
        text/richtext,rtx,,0 =
        text/tab-separated-values,tsv,,0 =
        text/x-setext,etx,,0 =
        application/x-perfmon,pmc,,5 =
        application/x-perfmon,pma,,5 =
        application/x-perfmon,pmr,,5 =
        application/x-perfmon,pml,,5 =
        application/x-perfmon,pmw,,5 =
Performance
    Library = infoctrs.DLL
    Open = OpenINFOPerformanceData
    Close = CloseINFOPerformanceData
    Collect = CollectINFOPerformanceData
    Last Counter = REG_DWORD 0x00000756
    Last Help = REG_DWORD 0x00000757
    First Counter = REG_DWORD 0x00000738
    First Help = REG_DWORD 0x00000739
```

World Wide Web Server Registry Parameters

```
\registry\machine\system\currentcontrolset\services\w3svc [17 1]
    Type = REG_DWORD 0x00000020
    Start = REG_DWORD 0x00000003
    ErrorControl = REG_DWORD 0x00000000
    ImagePath = REG_EXPAND_SZ C:\WINNT\System32\inetsrv\inetinfo.exe
    DisplayName = World Wide Web Publishing Service
    DependOnService = REG_MULTI_SZ "RPCSS"  \
                                   "NTLMSSP"
    DependOnGroup = REG_MULTI_SZ
    ObjectName = LocalSystem
    Parameters
        MajorVersion = REG_DWORD 0x00000002
        MinorVersion = REG_DWORD 0x00000000
        AdminName = Administrator
        AdminEmail = Admin@corp.com
        MaxConnections = REG_DWORD 0x00002710
        LogType = REG_DWORD 0x00000000
        LogFileDirectory = REG_EXPAND_SZ C:\InetPub\wwwroot
        LogFileTruncateSize = REG_DWORD 0xffffffff
        LogFilePeriod = REG_DWORD 0x00000000
        LogFileFormat = REG_DWORD 0x00000000
        LogSqlDataSource = HTTPLOG
        LogSqlTableName = Internetlog
        LogSqlUserName = InternetAdmin
        LogSqlPassword = sqllog
        Authorization = REG_DWORD 0x00000005
        AnonymousUserName = IUSR_CLIENT4
        Default Load File = Default.htm
        Dir Browse Control = REG_DWORD 0x4000001e
        CheckForWAISDB = REG_DWORD 0x00000000
        CacheExtensions = REG_DWORD 0x00000001
        GlobalExpire = REG_DWORD 0xffffffff
        ServerSideIncludesEnabled = REG_DWORD 0x00000001
        ServerSideIncludesExtension = .stm
        DebugFlags = REG_DWORD 0x00000008
        ScriptTimeout = REG_DWORD 0x00000384
        ConnectionTimeOut = REG_DWORD 0x00001c20
        InstallPath = C:\WINNT\System32\inetsrv
        SecurePort = REG_DWORD 0x000001bb
        Filter DLLs = C:\WINNT\System32\inetsrv\sspifilt.dll
        AccessDeniedMessage = Error: Access is Denied.
        NTAuthenticationProviders = NTLM
        ServerComment =
        ADCLaunch
            AdvancedDataFactory
            RDSServer.DataFactory
        Script Map
            .idc = C:\WINNT\System32\inetsrv\httpodbc.dll
        Virtual Roots
            /, = C:\InetPub\wwwroot,,5
            /Scripts, = C:\InetPub\scripts,,4
            /MSADC, = C:\Program Files\Common Files\System\MSADC,,5
            /iisadmin, = C:\WINNT\System32\inetsrv\iisadmin,,1
    Performance
        Library = w3ctrs.DLL
        Open = OpenW3PerformanceData
        Close = CloseW3PerformanceData
        Collect = CollectW3PerformanceData
        Last Counter = REG_DWORD 0x00000790
        Last Help = REG_DWORD 0x00000791
        First Counter = REG_DWORD 0x00000758
        First Help = REG_DWORD 0x00000759
    Security [17 1]
        Security = REG_BINARY 0x000000d8 0x80140001 0x000000c0 0x000000cc
0x00000014 0x00000034 0x00200002 0x00000001 0x00188002 0x000f01ff
0x00000101 0x01000000 0x00000000 0x00000220 0x008c0002 0x00000005
0x00180000 0x0002018d 0x00000101 \
                   0x01000000 0x00000000 0x00000000 0x001c0000 0x000201fd
0x00000201 0x05000000 0x00000020 0x00000223 0x001400c8 0x001c0000
0x000f01ff 0x00000201 0x05000000 0x00000020 0x00000220 0x001400c8
0x001c0000 0x000f01ff 0x00000201 \
                   0x05000000 0x00000020 0x00000225 0x001400c8 0x00180000
0x000201fd 0x00000101 0x05000000 0x00000012 0x00000225 0x00000101
0x05000000 0x00000012 0x00000101 0x05000000 0x00000012
    Enum
        0 = Root\LEGACY_W3SVC\0000
        Count = REG_DWORD 0x00000001
        NextInstance = REG_DWORD 0x00000001


\registry\machine\software\unisys
    TPCC
        MAXTERMS = 10000
```

Tuxedo Configuration

Note: this configuration file is repeated on each of the other 2 clients with the exception of the Hostname, "CLIENT1", which is replaced by "CLIENT2" thru "CLIENT3".

```
*RESOURCES
IPCKEY          133133

MAXACCESSERS    400
MAXSERVERS      210
MAXSERVICES     1100
MODEL           SHM
MASTER          tpcctm
LDBAL           N
SCANUNIT        60
BLOCKTIME       60
BBLQUERY        60

*MACHINES
DEFAULT:

CLIENT1         LMID=tpcctm
                TUXDIR="c:\tuxedo"
                APPDIR="c:\tuxedo\runtime"
                TUXCONFIG="c:\tuxedo\runtime\tuxconfig"
                ULOGPFX="c:\tuxedo\runtime\ulog\ULOG"
                TYPE="WinNT"
                UID=0
```

```
              GID=0

*GROUPS
GRALL
       LMID=tpcctm    GRPNO=1   OPENINFO=NONE

GRDEL
       LMID=tpcctm    GRPNO=3   OPENINFO=NONE

*SERVERS
DEFAULT:
              CLOPT="-A -- -sAVALON4 -dtpcc"
```

```
tpccsvr        SRVGRP=GRALL
               SRVID=100
               MIN=76 MAX=200
               RQADDR=allq REPLYQ=Y

tpccdelv       SRVGRP=GRDEL
               SRVID=300
               MIN=8 MAX=20
               RQADDR=delq REPLYQ=Y

*SERVICES
```

Appendix D - RTE Code

Admin Environment

```
if '%1'=='' goto usage
if '%2'=='' goto usage
if '%3'=='' goto usage

:paramok

net time \\%1 /SET /Y

if %ERRORLEVEL% NEQ 0 pause

set WEBADMINCFG=web%2.cfg
set WEBMAXDRIVERS=%3
set WEBDIAGLEVEL=4
set WEBEVENTLOG=0
set WEBEVENTHOST=
set WEBCHECKLEVEL=2

webadmin.exe

goto end

:usage
@ECHO You must supply the following parameters:
@ECHO "webnnn.cmd <clock sync host name> <cfg file suffix> <driver count>"
pause

:end
```

Profiles used for Performance Run

Web1948.cfg

```
//
//  Common Driver Configuration
//
INITBASEPORT 4300
INITSYNCMAX 4
INITPAUSE 1
INITRSCALE 420
INITTSCALE 100
INITRWID 1, 1948
INITFIXEDWID 1
INITCCLAST 208
INITCCID 208
INITCITEMID 208
//
//  Configuration Driver 1
//
1 INITIPADDR 192.168.90.31
1 INITIISADDR 192.168.12.1
1 INITIISPORT 80
1 INITBROWSERS 820
1 INITMYWID 1,82

//
//  Configuration Driver 2
//
2 INITIPADDR 192.168.90.31
2 INITIISADDR 192.168.22.2
2 INITIISPORT 80
2 INITBROWSERS 810
2 INITMYWID 83,163

//
//  Configuration Driver 3
//
3 INITIPADDR 192.168.90.31
3 INITIISADDR 192.168.32.3
3 INITIISPORT 80
3 INITBROWSERS 810
3 INITMYWID 164,244

//
//  Configuration Driver 4
//
4 INITIPADDR 192.168.90.32
4 INITIISADDR 192.168.13.1
4 INITIISPORT 80
4 INITBROWSERS 820
4 INITMYWID 245,326

//
//  Configuration Driver 5
//
5 INITIPADDR 192.168.90.32
5 INITIISADDR 192.168.23.2
5 INITIISPORT 80
5 INITBROWSERS 810
5 INITMYWID 327,407

//
//  Configuration Driver 6
//
6 INITIPADDR 192.168.90.32
6 INITIISADDR 192.168.33.3
6 INITIISPORT 80
6 INITBROWSERS 810
6 INITMYWID 408,488

//
//  Configuration Driver 7
```

```
//
7 INITIPADDR 192.168.90.33
7 INITIISADDR 192.168.14.1
7 INITIISPORT 80
7 INITBROWSERS 820
7 INITMYWID 489,570

//
//  Configuration Driver 8
//
8 INITIPADDR 192.168.90.33
8 INITIISADDR 192.168.24.2
8 INITIISPORT 80
8 INITBROWSERS 810
8 INITMYWID 571,651

//
//  Configuration Driver 9
//
9 INITIPADDR 192.168.90.33
9 INITIISADDR 192.168.34.3
9 INITIISPORT 80
9 INITBROWSERS 810
9 INITMYWID 652,732

//
//  Configuration Driver 10
//
10 INITIPADDR 192.168.90.34
10 INITIISADDR 192.168.15.1
10 INITIISPORT 80
10 INITBROWSERS 820
10 INITMYWID 733,814

//
//  Configuration Driver 11
//
11 INITIPADDR 192.168.90.34
11 INITIISADDR 192.168.25.2
11 INITIISPORT 80
11 INITBROWSERS 810
11 INITMYWID 815,895

//
//  Configuration Driver 12
//
12 INITIPADDR 192.168.90.34
12 INITIISADDR 192.168.35.3
12 INITIISPORT 80
12 INITBROWSERS 810
12 INITMYWID 896,976

//
//  Configuration Driver 13
//
13 INITIPADDR 192.168.90.35
13 INITIISADDR 192.168.16.1
13 INITIISPORT 80
13 INITBROWSERS 810
13 INITMYWID 977,1057

//
//  Configuration Driver 14
//
14 INITIPADDR 192.168.90.35
14 INITIISADDR 192.168.26.2
14 INITIISPORT 80
14 INITBROWSERS 810
14 INITMYWID 1058,1138

//
//  Configuration Driver 15
//
15 INITIPADDR 192.168.90.35
15 INITIISADDR 192.168.36.3
15 INITIISPORT 80
15 INITBROWSERS 810
15 INITMYWID 1139,1219

//
//  Configuration Driver 16
//
16 INITIPADDR 192.168.90.36
16 INITIISADDR 192.168.17.1
16 INITIISPORT 80
16 INITBROWSERS 810
16 INITMYWID 1220,1300

//
//  Configuration Driver 17
//
17 INITIPADDR 192.168.90.36
17 INITIISADDR 192.168.27.2
17 INITIISPORT 80
17 INITBROWSERS 810
17 INITMYWID 1301,1381

//
//  Configuration Driver 18
//
18 INITIPADDR 192.168.90.36
18 INITIISADDR 192.168.37.3
18 INITIISPORT 80
18 INITBROWSERS 810
18 INITMYWID 1382,1462

//
//  Configuration Driver 19
//
19 INITIPADDR 192.168.90.37
19 INITIISADDR 192.168.18.1
19 INITIISPORT 80
19 INITBROWSERS 810
19 INITMYWID 1463,1543

//
//  Configuration Driver 20
//
```

```
20 INITIPADDR 192.168.90.37
20 INITIISADDR 192.168.28.2
20 INITIISPORT 80
20 INITBROWSERS 810
20 INITMYWID 1544,1624

//
//  Configuration Driver 21
//
21 INITIPADDR 192.168.90.37
21 INITIISADDR 192.168.38.3
21 INITIISPORT 80
21 INITBROWSERS 810
21 INITMYWID 1625,1705

//
//  Configuration Driver 22
//
22 INITIPADDR 192.168.90.38
22 INITIISADDR 192.168.19.1
22 INITIISPORT 80
22 INITBROWSERS 810
22 INITMYWID 1706,1786

//
//  Configuration Driver 23
//
23 INITIPADDR 192.168.90.38
23 INITIISADDR 192.168.29.2
23 INITIISPORT 80
23 INITBROWSERS 810
23 INITMYWID 1787,1867

//
//  Configuration Driver 24
//
24 INITIPADDR 192.168.90.38
24 INITIISADDR 192.168.39.3
24 INITIISPORT 80
24 INITBROWSERS 810
24 INITMYWID 1868,1948

//
```

Driver Environment

```
if '%1'==' goto usage

:paramok

set WEBDRIVERNO=%1
set WEBADMBASEPORT=4300
set WEBDIAGLEVEL=2
set WEBEVENTLOG=1
set WEBEVENTHOST=
set WEBLOGLEVEL=1
set WEBSINGLETRAN=0
set WEBTPCCAUDIT=0
set WEBRTFUDGETM=110
set WEBNEWORDERPROB=4484
set WEBPAYMENTPROB=4307
set WEBORDERSTATUSPROB=403
set WEBDELIVERYPROB=403
set WEBSTOCKLEVELPROB=403
set WEBTTNEWORDER=12030
set WEBTTPAYMENT=12030
set WEBTTDELIVERY=5060
set WEBTTORDERSTATUS=10070
set WEBTTSTOCKLEVEL=5060

webdriver.exe

goto end

:usage
@ECHO  You must supply the following parameters:
@ECHO  "webdriver.cmd <driver number>"
pause

:end
exit
```

Appendix E - Disk Storage

TPC-C 180-Day Disk Space Requirements

Warehouses	**1968**	tpmC	**24,328.67**	tpmC/W	12.36

Table	**Initial Rows**	**Data KB**	**Index KB**	**Extra 5% KB**	**Total With 5% KB**
Warehouse	1,968	216	56	14	286
District	19,680	2,192	64	113	2,369
Customer	59,040,000	42,938,184	2,757,160	2,284,767	47,980,111
History (D)	59,040,000	3,280,064	0		3,280,064
Order (D)	59,040,000	1,809,656	999,584		2,809,240
New-Order	17,712,000	280,032	784	14,041	294,857
Order-Line (D)	590,403,579	36,900,224	91,920		36,992,144
Item	100,000	9,528	88	481	10,097
Stock	196,800,000	62,976,000	141,128	3,155,856	66,272,984
Totals KB		148,196,096	3,990,784	5,455,272	157,642,152

Db/Filegroup	**Count**	**Size MB**	**MB Allocated**	**MB Loaded +5%**	**MB for 8 Hours**
master, model & msdb		22	22	22	22
tempdb		10	10	10	10
mssql70_tpcc_root	1	10	10	10	10
mssql70_cs_fg	7	16,800	117,600	111,575	111,575
mssql70_misc_fg	7	7,875	55,125	42,372	52,464
Total Allocated MB			**172,767**	**153,989**	**164,082**

	MB	
Dynamic Space MB	41,006	Sum of data for orders, order_line & history
Static Space	112,942	Sum of data+index+5% - Dynamic Space
Free Space	18,820	Total allocated space - (Dynamic & Static Spaces)
Daily Growth	8,111	(Dynamic Space / (W * 62.5)) * tpmC
Daily Spread	6,654	Free space - 1.5 * Daily growth (zero if negative)
	0	SQL Server can be configured to eliminate Daily Spread
180 Day Space MB	1,572,868	Static Space + 180 * (Daily Growth + Daily Spread)
180 Day Space GB	**1,536.00**	
8 hr log GB	**59.46**	(need double for mirroring)

Disk Capacity MB	4372	**4.2695 GB**	Capacity of 4GB disks
	8747	**8.5420 GB**	Capacity of 9GB disks
	17496	**17.0859 GB**	Capacity of 18GB disks

Space Usage	**GB Needed**	**Disks Priced**	**GB Priced**	
180-day space DB	1536.00 GB	56	239.09 GB	4GB drives
		168	1435.05 GB	9GB drives
Total DB		**224**	1674.15 GB	
8-hr log+mirror	118.93 GB	8	136.69 GB	18GB drives
OS, SQL Server	4.24 GB	1	4.24 GB	4GB drive
Total space	**1659.17 GB**	**233**	**1815.07 GB**	

TPC-C 180-Day Dynamic Table Growth Rates for 8 Hours						24,328.67 tpmC	
Tables	**Initial (KB)**	**Final (KB)**	**Change(KB)**	**Unused (KB)**	**KB / New-Order**	**8-Hr MB**	
History	3,280,064	3,994,216	714,152	99,464	0.0691	3,991.33	
Orders	2,809,240	4,418,368	1,609,128	13,216	0.1557	4,519.23	
Order_line	36,992,144	43,813,680	6,821,536	8,832	0.6601	43,653.39	
Dynamic	**43,081,448**	**52,226,264**	**9,144,816**	**121,512**	**0.8850**	**52,163.95**	
New_order	280,816	473,944	193,128	16,024	0.0187	487.37	
Static							
Log	477,291	55,228,887	54,751,597		**5.2985**	60,890.00	59.463
SUM(d_next_o_id)	59,059,680	69,393,186	10,333,506				

Appendix F - Third-Party Price Quotations

Microsoft Corporation
One Microsoft Way
Redmond, WA 98052-6399
Tel 425 882 8080
Fax 425 936 7329
http://www.microsoft.com/

Microsoft

July 23, 1999

Mr. Jerrold Buggert
Director, Systems Analysis, Modeling, Measurement
Unisys Corporation
25725 Jeronimo Road
Mission Viejo, CA 92691
949-380-5106
949-380-5539 fax

Dear Mr. Buggert:

Here is the information you requested regarding U.S. pricing of several Microsoft products that were used in a recent TPC-C benchmark:

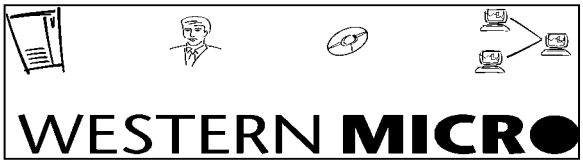
Microsoft SQL Server 7.0, Enterprise Edition (one server plus unlimited CALs)	$28,999
Microsoft Windows NT Server 4.0, Enterprise Edition (one server plus 25 CALs)	$3,999
Windows NT Server 4.0 (one server w/5 CALs, no discount for additional servers)	$809
Visual C++ Professional 6.0 (single copy)	$549
5-year maintenance for above software @ $2095/yr	$10,475

This quote is valid for the next 90 days.

If I can be of any further assistance, please contact me at 425-936-5301 or tomkr@microsoft.com.

Yours truly,

Thomas Kreyche
Product Manager
SQL Server Marketing



Western Micro Technology **8/9/99**
(800)937-8446

Quoted to: Jerry Buggert/Unisys for TPC.org
Prepared by: Tony Jacobs

Qty.	Description	Style	Price	Extended Price
1	SYS: Aquanta ES5045, w/ CDRom, 0 Proc, 0MB Mem	ES504151-GZN	$6,041	$6,041
4	PROC: 500MHz Pentium III Xeon /2MB Cache	XEO3500-2MB	$5,893	$23,572
6	ACC:Voltage Regulator Module	XEO24001-VRM	$44	$264
1	MEM:ECC Memory Board, 0MB Mem	MEM241-MBD	$398	$398
32	MEM: 128 MB Memory Upgrade	DIM5072-128	$398	$12,736
1	DISK: 4GB Drive, Ultra SCSI SCA	HDS417-CX1	$406	$406
1	ETHERNET: 100Mbit/sec, PCI 32-bit	ETH1010051-PCI	$99	$99
1	ACC: HBA, SCSI w/ VHD Connector	PCI300-SUW	$273	$273
1	ACC: Value Add Software	ESS504010-N	$368	$368
1	MONITOR:15-inch Color	EVG2100-P	$221	$221
1	KEYBD: 104 Key Spacesaver	PCK104-SKB	$26	$26
1	MOUSE: 2 Button PS2	PWM1-PS2	$15	$15
	Server Total			**$44,419**
62	DISK: 4GB Drive, 10K, SCA	OSD4205-W45	$588	$36,456
185	DISK: 9GB Drive, 10K, SCA	OSD9205-W45	$618	$114,330
10	DISK: 18GB Drive, 10K, SCA	OSD9205-W45	$1,153	$11,530
14	CAB: 7 SCA Disk Cage w/ 050 I/F & Cat Cbl, 3U	OSM310050-U05	$1,345	$18,830
21	CAB: 7 SCA Disk Cage w/ 057 I/F, 3U	OSM310057-U05	$1,353	$28,413
2	CAB: 7 SCA Disk Cage w/ 100 I/F, 0MB, 3U	OSM310100-U05	$2,735	$5,470
2	MEM: 32MB OSM Cache	OSM1032-MEM	$187	$374
2	PWR: OSM 2nd Power Supply	OSM3000-BPF	$392	$784
1	PWR: 3000 VA UPS, 3U	UPD30001-SXR	$1,897	$1,897
6	PWR: Distribution Unit, 6 OSM Cabinets	RM1-PDU	$379	$2,274
23	CBL: SCSI 68-pin HD->VHD Conn's	CBL2210-OSM	$96	$2,208
37	CAB: Rackmount Kit for Disk Cages	OSM3000-RMK	$84	$3,108
3	CAB: Rack Cabinet, w/ fill pnls, 36U	CAB361-SXR	$1,694	$5,082
3	CAB: Bezel kit 36U	BEZ3611-CAB	$295	$885
2	CAB: Stabilizer kit 0U	WGT39581-SXR	$206	$412
3	PNL: L&R side panels 36U	PAN3621-SXR	$283	$849
1	CAB: Rack Cabinet, w/ fill pnls, 19U	CAB191-SXR	$1,621	$1,621
1	CAB: Bezel kit 19U	BEZ1911-CAB	$239	$239
1	PNL: L&R side panels 19U	PAN1921-SXR	$210	$210
	Storage Total			**$234,972**
3	SYS: NetServer LC3, w/1 450MHz Proc & CDROM, 0MB Mem	D7029-AV	$1,660	$4,980
3	PROC:1x450MHz Pentium II/512KB Cache UPG	D7032-AV	$993	$2,979
12	MEM: 128 MB SDRAM Memory Upgrade	D6098-AV	$255	$3,060
3	DISK: 4GB SCSI 3.5 Internal	D4910-AV	$303	$909
15	ETHERNET: 10/100TX Mbit/sec, PCI 32-bit	D5013-AV	$68	$1,020
3	ETHERNET: 100Mbit/sec, PCI 32-bit, Quad	SF1001-ET4	$958	$2,874
3	MONITOR:15-inch Color	EVG2100-P	$221	$663
	Client Total			**$16,485**
	Server, Storage and Client Total			**$295,876**
	Discount based on total dollar volume			**($29,588)**
Quote Total				**$266,288**

Quote valid for 90 days.

Disks come with return to factory, 5 year warranty, 7 day replenishment

American Megatrends

Date 7/23/99

Contact Name: **Rick Freeman**
Company: **Unisys**
Phone Number: **(949)380-5539**
Fax Number: **(949)380-5344**

MegaRAID PCI SCSI Disk Array Series 438-H Controller Quotation

The quotation is valid for 90 days from the date shown above.

Price Quote

MeaRAID Product	Qty 1-20	Description
MegaRAID Ultra2 LVD, Series 438-H, P/N 4383508116	$1395.00	Series 438-H, Super high performance RAID Controller, 3 Channel, with 16MB memory and Battery Back-up, NT Monolithic driver and appropriate F/W
Product Warranty	$62.00 Per Unit	Extended Warranty for two years

Distinguishing Features:

⇒ Boot-up Configuration Utility
⇒ AMI High Performance RAID Firmware on Flash EPOM
⇒ Support for Low Voltage Differential

Conditions:

- All pricing is quoted FOB factory, Norcross, GA; shipping and insurance are additional.
- Quotation is subject to the execution of a Purchase Agreement
- 3 years limited warranty with optional 2 years extended warranty for amount of $62 per unit
- RMA is in accordance with AMI's standard. Return and Repair within 7 days
- Product is available now

Deliverables:

- Product will be shipped in bulk packaging or individually depending on quantity, each sealed in ant-static bag.
  Manuals and NT Monolithic Drivers will be shipped with Product (Individual Packaging) or in separate box if product is shipped in bulk.

Submitted by: Siamak Iranpour
Senior Program Manager

6145-F Northbelt Parkway, Norcross, GA 600371-2976; Main: 770-246-8600; Direct: 770-246-8766; Fax: 770-246-8657

BEA ENTERPRISE MIDDLEWARE SOLUTIONS

August 10, 1999

Mr. Jerrold Buggert
Director, Systems Analysis, Modeling, Measurement
Unisys Corporation
25725 Jeronimo Road
Mission Viejo, CA 92691
Fax (949) 465-2552

Dear Mr. Buggert:

Per your request I am enclosing the pricing information regarding TUXEDO 6.3 that you requested. This pricing applies to Tuxedo 6.1, 6.2, 6.3, 6.4 and 6.5. Please note that Tuxedo 6.5 is our most recent version of Tuxedo but that all 6.x releases are generally available.
Core functionality services pricing is appropriate for your activities. As per the table below Unisys Intel-based server systems are classified as either a Tier 1, Tier 2 or Tier 3 server depending on the CPU capacity of the system. The Aquanta 4 way systems are Tier 2, and the Aquanta 8-way server is Tier 3 , and the NetServer LC3 clients (2-way Pentium II technology) are Tier 1. This quote is valid for 90 days from the date of this letter.

Tuxedo Core Functionality Services (CFS) Program Product Pricing and Description

TUX-CFS provides a basic level of middleware support for distributed computing, and is best used by organizations with substantial resources and knowledge for advanced distributed computing implementations.

TUX-CFS prices are server only and are based on the overall performance characteristics of the server and uses the same five tier computer classification as TUXEDO 6.x. Prices range from $3,000 for Tier 1 to $250,000 for Tier 5. Under this pricing option EVERY system running TUX-CFS at the user site must have a TUXEDO license installed and pay the appropriate per server license fees.

Very Truly Yours,

Lewis D. Brentano,
Director, Market Planning

BEA Tux/CFS Unlimited User License Fees Per Server

Unlimited User License fees per server	Number of Users	Dollar Amount	Maintenance (5 x 8) per year	Maintenance (7 x 24) per year
Tier 1 -- PC Servers with 1 or 2 CPUs, entry level RISC Uni-processor workstations and servers (Class 1and Class 2)	Unlimited	$3,000.00	$480.00	$690.00
Tier 2 - PC Servers with 3 or 4 CPUs, Midrange RISC Uni-processor servers and workstations (class 3)	Unlimited	$12,000.00	$1,920.00	$2,760.00
Tier 3 - Midrange Multiprocessors, up to 8 CPUs per system capacity (Class 4 and 5)	Unlimited	$30,000.00	$4,800.00	$6,900.00
Tier 4 - Large (more than 8, less than 32 CPUs) and Mainframe Systems (Class 6)	Unlimited	$100,000.00	$16,000.00	$23,000.00
Tier 5 - Massively Parallel Systems, > 32 processors	Unlimited	$250,000.00	$40,000.00	$57,500.00

Intel based server tier classifications:

		Tier 1	Tier 1	Tier 2	Tier 3
Platform	**Operating System**				
Intel Pentium/ Pentium Pro PCs	Interactive R3.2 ESIX SVR 4.0 SCO UNIX 3.2.2 and 3.2.4 SCO ODT 2.x,3.x Solaris x86 2.X UnixWare, Windows NT 3.5/4.0	All 386/486 PCs are Class 1	ALL Pentium PCs with 1 or 2 CPUs capacity are Tier 1	ALL Pentium PCs with 3 or 4 CPUs capacity are Tier 2	ALL Pentium PCs with 5,6,7, or 8 CPUs Capacity are Tier 3

Software House International Pricing Proposal	Quotation #MO-990805-62499 08/05/99

Unisys Corporation
Rick Freeman
Quote Good for Ninety Days
,
Phone: Fax: 949-465-2552

SHI Account Exec: Matthew O. Martin
Telephone : (800) 52 - SOFTWare
Fax : (908) 805 - 0818

Reference:

Product	Part #	Qty	List	Your Price	Total
8 Port 10BT Generic Hub 5 Year Return to Man War 2500+ Quantity	Z99552	2500		$28.00	$70,000.00
Total					$70,000.00

Additional Comments:

NETLUX

14180 Live Oak Ave., Unit E
Baldwin Park, Ca. 91760

1-800-789-1780
Phone#626-851-9737
Fax #626-851-9837

August 6, 1999

Rick Freeman
Unisys Corporation
25725 Jeronimo Road
Mission Viejo, CA 92691
Fax: (949) 380-5539
cc: (949) 380-5344

Quotation

Quantity	Part No.	Description	Unit Price	Total
3	NX-SW8	NETLUX 8-port 10/100Mbps FAST Ethernet Switch	$229.00	$ 687.00

NOTE: The NX-FS4 has been discontinued.

Terms and Conditions:
FOB Origin
Quote Valid for 90 days
5 Year Warranty

Sincerely,
Martin Parry
NETLUX